THE OIL WEEKLY

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PUBLISHED BY
THE GULF PUBLISHING COMPANY
HOUSTON, TEXAS

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Member Audit Bureau of Circulation
Member Associated Business Papers, Inc.

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PITTSBURGH.....Vandergrift Bldg.
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Published by
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The Oil Man's Calendar

JAN.	
12–13	Louisiana Engineering Society, St. Charles Hotel, New Orleans.
FEB.	
12–15	American Institute of Mining & Metallurgical Engineers, New York.
MAR.	
14–15	American Petroleum Institute, Mid-Continent District, Division of Production, Wichita, Kansas.
28–29	American Petroleum Institute, Southwestern District, Division of Production, Houston, Texas
31	Western Petroleum Refiners Association, Wichita, Kansas.
APR.	
10–12	American Association of Petroleum Geologists, Chicago.
11–12	American Petroleum Institute, Eastern District, Division of Production, Columbus, Ohio.
18–19	National Petroleum Association, Cleveland, Ohio.
MAY	
18–25	International Petroleum Exposition & Congress, Tulsa.
26–27	Petroleum & Natural Gas Conference, State College, Pa.
27–31	American Petroleum Institute, Mid-Year Meeting, Ft. Worth, Tex.

Contents « December 25, 1939

Volume 96, Number 3

This Week's Panorama.....11

Feature Section.....12-44

Equitable Proration of Marginal Leases in East Texas..12
By DR. IONEL I. GARDESCU

New Proration Plans for East Texas Suggested.....14

Temperatures Affecting Crude Oil Production.....15
By MICHEL T. HALBOUTY

Range and Application of Gas-Lift Methods, Part 4.....20
By E. C. BABSON

Predicting Wet Gas Recovery in Recycling Operations...30
By JUDSON S. SWEARINGEN

Advantage—Good Oil Demand; Handicap—Surplus Gasoline.....40
By L. J. LOGAN

News Section and News Index.....45

Notes for the Equipment Buyer and User.....69

Squeaks from the Bull Wheel.....73

Advertisers Index.....74

Published every Monday. Single Copies 15 cents (Special Issues 50c). Subscription price: domestic and foreign, $2.00 a year; 2 years $3.00. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil industry or the manufacturing and distribution of oil field supplies. Advertising rates on application. Copyrighted 1939, by The Gulf Publishing Company.

Seasons Greetings
For the many courtesies you have extended us throughout the year, we thank you sincerely.
May your Christmas be joyful and the New Year prosperous.
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THE OIL WEEKLY

DECEMBER 25, 1939

VOLUME 96 NUMBER 3

The Week's Panorama

BUSINESS conditions in the United States during the next several months are expected to be controlled largely by domestic influences, inasmuch as the war trade situation still is undetermined.

The European war has continued to be of diminishing influence, and business has returned to a more normal basis; as fears of price rises and delivery difficulties have subsided, following the sensational and largely psychological spurt at the outset of the war.

Oil Exports in 1940 . . . .

Calculations on probable exports in 1940, made by some of the larger oil companies, indicate that shipments may not be materially greater than in 1939, if as large. Some companies, in fact, foresee decreases in export business. It is possible to foresee foreign demand for an extended period ahead, inasmuch as business from abroad usually is booked far in advance.

Oil Equipment Exports . . .

Exports of oil field and refinery equipment have continued around last year's levels, having been affected only to a limited extent by the European war, as such equipment has been going principally to South American countries.

The Department of Commerce has reported that in October, exports of petroleum and gas well drilling apparatus and parts totaled $1,712,565, compared with $1,621,314 in September; while exports of other petroleum well and refining machinery and parts amounted to $651,022 in October, against $1,041,222 in September.

Automotive Outlook . . . . .

Automobile manufacturers tentatively plan to produce 1,250,000 cars and trucks in the United States and Canada in the first three months of 1940. That would be 16 percent more than output in the similar period of 1939, and the third largest production on record for the initial quarter. The manufacturers expect the past year's uptrend in demand to continue at least some months into 1940.

Automobile Sales . . . . . .

Factory sales of passenger cars and trucks in the first 11 months of 1939 totaled 3,259,078 units, or 45 percent more than in the similar period of 1938, according to the Automobile Manufacturers' Association. There were 365,900 sales in November, 1939, which exceeded sales of October 13 percent, although failing by 6.2 percent to equal November, 1938, sales.

Texas Tethers Tight . . . . .

In Texas there is worry over the problem of too many wells, too many well completions, and the resultant too-low allowables. Little hope is held of allowables holding up, as new wells continue to enter the picture. There are now 90,000 producing wells in the state, following a net gain of 5,000 in 1939, although the much-drilled East Texas field has furnished only about 400 new wells this year, and currently is not showing any further gains.

In order to hold production within market demand, Texas conservation officials have been forced to increase shutdowns until the fields of the state now are closed in almost half the time.

Shutdowns in Disfavor . . . .

The frequent shutdowns of Texas fields are in growing disfavor, and many operators are urging a return to the 7-day producing week, even though net weekly allowables are left unchanged. That would mean cutting the base allowables greatly—and openly restricting wells in some fields below the "marginal well" exemptions set up in the state proration law. East Texas wells, for example, would have to be cut materially below the 20 barrels a day to which they apparently are entitled under the law. However, many Texas operators want a showdown on the marginal well law and if necessary a revision of that law, so as to get back on a normal producing week.

The Texas Railroad Commission, also, appears to have tired of the subterfuge and allowable juggling involved in the shutdown system. That the commission may go ahead and face the issue squarely was indicated in the recent statewide hearing when a member sent up a trial balloon, suggesting that the 7-day week might be restored in February, without exceeding the Bureau of Mines estimate of demand.

Illinois Fields . . . . . .

At the beginning of December there were 4799 producing wells in the new fields of Illinois, putting out about 330,000 barrels daily. The leading field, Salem-Lake Centralia, had 1478 producing wells and a daily production of about 185,000 barrels, an average of 125 barrels daily per well. Runner-up Louden had 1290 wells that were yielding 70,000 barrels daily, or 54 barrels daily per well.

Tractors and Oil . . . . . .

At present there are approximately 1,652,654 farm tractors in the United States, representing a yearly market for about 2,313,715,600 gallons of tractor fuel, 66,106,160 gallons of motor oil, 231,371,560 pounds of transmission and differential lubricants, and 33,053,080 pounds of chassis lubes and specialized greases.

Equitable Proration in East

LAST June when a Federal District Court declared the method of prorating wells in the gigantic East Texas field void (for failing to consider acreage and oil in place), the ownership of many millions of barrels of oil not yet produced from the pay horizon were placed at stake. In view of the enormous reserve still in the ground, from 1,750,000,000 to 2,750,000,000 barrels, a nominal change in the method of apportioning proration allowables might shift the ownership of a great volume of oil.

With the subsequent upholding of this decision by higher courts and the issuing of a completely new East Texas proration order by the Texas Railroad Commission, the question of just who was to lose and who was to gain these millions of barrels of oil to be produced eventually became an actual reality that confronted operators in the field. It is a question not yet ironed out to the satisfaction of a great many East Texas participants, particularly in view of the commission's order that raised the field's total allowable to a point previously considered beyond the optimum flowing rate, and several new plans for prorating the field were offered at the statewide hearing in Austin on December 15.

The accompanying article presents the views of a consulting geologist and engineer familiar with the field. Both the author and this magazine realize fully that there probably will be some who disagree with the opinions expressed here. The OIL WEEKLY, therefore, invites additional discussion of this highly important subject.

SEVERAL plans have been offered at the statewide proration hearing held in Austin beginning December 15 in defense of the frustrated rights of the western marginal lease owner of the East Texas field. There is no doubt about the fact that the distribution of allowables and the shut-down programs have not favored him. The East Texas field is considered a water-driven field and as such, for every barrel of oil recovered from a down-dip marginal lease, many other barrels of oil have migrated from the lease, up dip, to be produced by wells located in more favorable structural locations.

The water-drive character of the East Texas field cannot be denied. All the formulae developed by various engineers showing the relationship of reservoir pressure and fluid withdrawal are based on the conception of a water-driven field. These formulae have been studied and tested very carefully. Predictions have been made of future relationships of pressure and withdrawal of fluid from the East Texas field and these predictions and calculations have agreed very closely with the facts obtained from subsequent field data. Such results could not have been obtained if the field was not produced by water drive. The fact that the pressure of the reservoir remained practically constant at certain rates of withdrawal of fluid and increased as these rates were decreased, and vice versa, is sufficient proof to the layman who is not so well versed in mathematical equations that there is some substance that flows into the reservoir filling up the voids left by the withdrawal of oil and maintains the pressure of the reservoir. Such agent cannot be free gas evolved from solution because the field has been operated to the present at a pressure that exceeds the saturation pressure of the oil.

Some engineers have expressed a theory that the voids caused by the withdrawal of oil are replaced by the expansion of the sand itself, but very careful measurements on the compressibility and expansion of sands show that such cannot be the case. The only other agents that could replace the void produced by the removal of oil are some more oil or water. Most of the water that replaces the withdrawn oil is edge-water which occurs in the same sand as the oil, and, as the oil is being removed, the water migrates up-dip towards the higher portions of the structure. Under these circumstances depletion of oil in a sand reservoir would result only from a replacement of the oil by water.

In the favorably located lease the oil is being replaced by more oil and therefore there is no depletion of the sand in the strict sense of the word; whereas in the sand reservoir underlying the marginal lease the water is depleting the sand not only at the rate at which oil is being produced from that lease but also at the rate at which oil is migrating upward.

The rate of encroachment of water in an oil reservoir is a function of time since the replacement of oil by water is not spontaneous but gradual. Thus, if a field has produced 10,000,000 barrels as of a certain date, the water would have reached a certain level as of that same date. If the field is then closed in for some time, the water will not remain at that same level but will continue to encroach pushing the oil ahead and building up the depleted reservoir pressure of the field. The longer the period of shutdown and the greater the delay in rate of recovery, the further will be the advancement of the edge-water, other conditions being equal. The practice of production through delayed drilling is based primarily on this phenomenon.

Therefore, under condition of proration the owner and the operator of marginal leases are penalized because of the relatively greater rate of depletion of their lease in terms of recovery and should the field be completely shut down, they risk finding most of the oil having migrated upward and off their lease, with no recourse for their loss.

H. C. Miller, senior petroleum engineer with the United States Bureau of Mines, called attention to this fact in a book published by the American Petroleum Institute in 1929 under the heading of "Effect of Shutting in Wells on Future Production." "The evidence cited," states Miller "indicates that any general shutdown should be cooperative with adjustments for changes in production resulting from unusually favorable or unfavorable location on the structure. Wells located near the edge-water line or already producing large

# of Marginal Leases Texas

By DR. IONEL I. GARDESCU,
Gardescu and Speed, Consulting Petroleum Engineers and Geologists

quantities of water may necessarily be left out of any general shutdown if it is believed that their production will be destroyed entirely by a shutdown."

The above-mentioned report of the Bureau of Mines infers that the owner and the operator of the marginal lease should be compensated for their loss of oil caused by the water encroachment and certainly should not be penalized because of the fact that others are taking their oil.

Several operators more fortunate in the location of their leases have asked from time to time for a shutin of the field over a long period of time. Such an action would only result in a full confiscation of what little oil is left underlying the marginal lease.

The same report of the Bureau of Mines shows that the shutting in of a field does not have any ill effects on the ultimate recovery of oil from the field as a whole. Therefore if operators of marginal leases have other leases located in more favorable structural positions, the shutin of the field may benefit them in the end by bringing about pressure restoration and the gains derived therefrom. The only loser in this case would be the landowner and operator whose sole property or lease lies close to the edgewater.

Spellers' Formula

As stated at the beginning of this article, there is no doubt about the unfairness of the present proration schedule to the owner of the marginal lease in the East Texas field. In defense of such owners Frank N. Spellers has offered to the Texas Railroad Commission a formula which he claims would more nearly do equity to each operator. The formula is based on a well density and structural location basis instead of the present well potential and sand thickness factors, which, he claims, give undue advantage to the wells on the fairway, or the central portion of the field.

Spellers' formula is based on the premise that each lease owner and operator is entitled to produce a share of oil proportional to the volume of oil underlying his lease. In the first place, this premise is in conflict with the fundamental law of capture which has governed the production and recovery of oil and from a legal viewpoint I doubt whether the application of such a formula could ever be enforced.

Spellers objects to the present use of both the well potential and sand thickness factors in determining well allowables. It is true that the two factors give undue advantage to certain wells. Other conditions being equal, a greater sand thickness would result in a greater potential but it is also true that a well drilled in an area of greater permeability will have a greater potential, though the thickness of the sands would not be any greater. Such variations in permeability are commonly known in the East Texas field and the owner of a well enjoying a high potential as a result of favorable permeability should and always has been entitled to a greater share of the oil by virtue of the governing law of capture of oil.

To eliminate the factor of sand thickness would be in conflict with the allocation of production on the basis of original oil content of the lease. There seems to be nothing unreasonable about the use of either the potential and sand thickness factors, and neither one of the two facors should be eliminated. I agree with Spellers that undue advantage is given to certain wells by the use of the two factors as a product. Furthermore, as Spellers points out, there are other factors of equal or possibly even greater importance that have not been included in the calculation of the East Texas field well allowables.

The well factor suggested by Spellers is based on the assumption that the life expectancy of the East Texas wells will be determined by the structural position of the wells, the down-dip wells being abandoned first because of the water encroachment up-dip from west to east. On this basis, his proposed well factors range from 100 for the marginal western wells to two for the marginal eastern wells.

The usage of such a well factor disregards important economic and geologic facts. From an economic viewpoint, the value of 100 percent recoverable oil from the marginal western lease produced over a period of one or two years is far greater than the value of the same 100 percent recoverable oil from the eastern marginal lease produced over a period of 50 years. On the basis of a conservative 6 percent discount, the value of the oil discounted for an average period of 25 years would be 24 cents on the dollar and it is doubtful whether any bank would allow the owner or operator of the up-dip lease even the 24 cents in spite of all the assurances of a guaranteed 50 years recovery.

The other fact refers to the known geological unconformity between the producing oodbine sand and the overlying Austin chalk. It becomes very doubtful whether the sand pay of the producing eastern well extends as an oil bearing sand pay as far as the western edge of the field; the only condition under which the eastern well could have deprived the western marginal lease of his oil. The chances are that the limit of productivity of the eastern oil-bearing sand ends somewhere within the area of the field. The owner of the eastern marginal lease is thereby twice being penalized, first, because the life expectancy of his well is not going to be 50 years and second, because his ultimate recovery will be materially less. Spellers' well factor can only apply if the producing sand pay is continuous. The fact that thousands of wells drilled in the field have established an almost

complete continuity of pressures and even fluid movement does not eliminate the fact that there are other "marginal wells," subjected to water encroachment which are not located on the western edge of the field. Why should these other wells be deprived of the special regime of marginal wells when from a geological and production viewpoint they fall in the same category. The migration of oil towards the east is not denied. What I question is whether the producing pay of the eastern well extends out as a producing pay to the western end of the field. If it does not, and there are several engineering facts as well as geological facts that seem to point to the contrary, then Spellers' schedule of "well factors" is discriminating in favor of the western marginal leases.

The factor of acreage included in Spellers' formula has long been advocated by various engineers and its early use may have avoided some of our present problems derived from too close well spacing. The factor is not only in line with the issue of equitable recovery on the basis of original oil content but also is in agreement with the fundamental law of capture. Wells that interfere with one another because of close drilling will necessarily show a smaller potential and recovery if allowed to flow freely for any length of time than wells drilled further apart.

Return of Water to the Reservoir

The benefits derived through the maintenance of the reservoir pressure in the East Texas field to above the saturation pressure of the oil have been well emphasized by engineers and operators. These benefits are numerous, and may be summed up as resulting in increased recovery by more efficient utilization of reservoir energies and by minimizing edge-water by-pass; decreasing the cost of producing the oil and to some extent checking the drilling of unnecessary wells because of the limitation imposed by the field's daily allowable. These benefits need not be further discussed. The only issue of present interest is the method by which the pressure is to be maintained and the effect that such method would have on recovery of various leases.

Pressure maintenance by returning the water produced with the oil to the reservoir would naturally increase the field allowable of oil by the daily amount of water that was returned to the sand. The pressure withdrawal relationship of the field is not affected by the percentage of oil and water withdrawn but only by the total quantity of fluid, oil and water, that is being withdrawn from the field. If the field is considered as a whole, the benefits derived through the return of water to the reservoir are obvious. But this ultimate benefit can only be secured by penalizing the owners and operators of the western marginal leases. One cannot pump water in a well without chasing the oil away. It is also obvious that the return of water to the reservoir will build up pressure on the lease and thereby create a differential pressure which will drive the oil from the lease used for water injection purposes. Such a procedure is against the fundamental rights of ownership and the law of capture of oil.

On the other hand, oil that is forced to migrate eastward can also migrate westward as a result of heavy withdrawal of fluid on the western edge of the field because the direction of flow and drainage is not governed by structure but by the differential pressure created in the reservoir towards the points of reduced pressure caused by fluid withdrawals. If the East Texas field was allowed to be produced wide open without any restrictions controlling the conservation of energy, there is no reason why some of the marginal leases could not produce sufficiently large quantities of water that would not only check the encroachment of edge-water toward the east but would even result in the reversal of the present direction of migration of oil. Studies in bottom-hole pressure in West Texas and other areas show that such a condition is not only possible but actually exists.

I am not advocating the wide-open production of the East Texas field which would only result in a disastrous loss of values to the owner and operator as well as to the nation. I am merely pointing out that as long as we are being governed by the law of capture of oil the marginal lease owner enjoys certain rights which have been denied to him under the present proration plan and his rights would be further penalized through the injection of water on his lease or in the vicinity of his lease. To limit the rate of withdrawal of water-making wells would only result in a delay of recovery that would prevent the marginal lease owner and operator of recovering his equitable share of oil.

The production and recovery problems of the East Texas field when considered as a whole are most simple and easy to handle. But the East Texas field considered in terms of our governing laws and the rights of individuals to produce and share in its recovery is one of the most complex problems known. I am sure that the railroad commission of Texas would not have hesitated a second to apply an adequate formula of proration if such a formula was possible. The present basis of proration is inadequate and discriminating, but no formula has yet been offered that did not have these same faults and only through fair cooperation and compromise can this vital problem of proration ever be solved.

Revised East Texas Proration Plan Urged

PLANS to revise the East Texas proration system to give west edge operators a larger share of the proratable oil now were presented at a hearing before the Texas Railroad Commission recently. Frank Spellers, petroleum engineer for one group of operators, presented a program which he said would serve the purpose. After giving each well 20 barrels, he would base the allowable largely on sand top, increasing the allowance to the wells directly as the depth of the top of the producing sand.

This plan would give the highest allowances to those wells along the west edge and a lesser amount to wells on the east side of the field. The table below indicates the comparative well factors in proportion to subsea depth and is used in the application of the formula: acre-

[Continued on page 44]

Temperatures Affecting Crude Oil Production

By MICHEL T. HALBOUTY,
Consulting Geologist and Petroleum Engineer

In recent years, there have been numerous reports published on the conservation of natural reservoir energy, namely pressure, for the efficient and economical production of crude oil. Also, in these reports, it is generally assumed that the reservoir energy, in the form of temperature, will remain practically constant regardless of the rate of withdrawal and thus far, to the writer's knowledge, the study of the effects of subsurface temperature, on the flow of oil and gas through the sands, has been sorely neglected. Consequently, because of insufficient data concerning the effect of temperature upon formation drainage, only the condition in which temperature affects production at the surface will be discussed.

(1) Flowing Production

Solar heat is the principal factor to be considered in a discussion of the effects of temperature on production. In the Maracaibo Basin, Venezuela, were it not for the fact that the year round temperature seldom drops below 85° F. it would be impossible to produce some of the wells completed in the shallow tar sands. Gravity of the crude from these wells is extremely low, ranging from 9° to 14° A.P.I., and if allowed to drip out on a flat surface, the oil will actually appear to "stack-up." Thus we see the impossibility of attempting to transport this grade of oil through pipe lines at temperatures even as low as 60° F.

(a) *Wax and Paraffin Deposits Affected by Temperature.*

Probably the best example of a typical paraffin base oil is that produced in Pennsylvania. Certain oils produced in Oklahoma, Texas, and Mexico are of the "mixed-base" type; that is, an asphalt base oil with traces of solid paraffin or a paraffin-base oil with asphaltic products. Paraffin oils and the mixed-base type yield, on reduction to low temperatures, an appreciable portion of light wax.[14] In wells having bottom-hole temperature greater than 150° F. the accumulation of paraffin deposits in the tubing and flow line does not afford a serious problem during the summer months. However, as the surface temperature decreases, these wells necessitate frequent cleanouts. Usually, several times a month the paraffin, or wax deposits must be swabbed or scraped from the tubing and flow line to prevent complete stoppage of the fluid. Many ingenious methods have been devised to prevent the occurrence of paraffin accumulation by transmitting heat to the various lines during the winter months.

Several chemical compounds and mixtures, for removing paraffin and preventing its deposition, are on the market. They may be divided into two classes: namely, those that generate heat, thereby raising the temperature of the oil and melting the paraffin or increasing the solubility in the oil; also, those that act as a solvent to change the character of the wax so that it will not crystallize when the temperature is decreased below its original melting point.[15] The first method is accomplished by the injection of caustic soda and aluminum fillings which, upon the addition of water, react violently, evolving about 700 B.T.U. per pound of mixture. This method, however, has the disadvantage of a high cost and often fails to accomplish the desired results, especially when used to remove paraffin from casing and tubing, primarily because most of the heat is liberated at the bottom of the hole instead of along the entire length of the tubing. To be effective, these chemical compounds and mixtures must be added continuously and allowed to remain in close association with the oil until the reaction is complete. In most cases, all the treated oil is removed from the well before any appreciable amount of paraffin has been dissolved.

A very efficient and practical method of eliminating paraffin deposits is found in equipping wells with steam coils; and at intervals, during which time excessive paraffin has accumulated, a small portable boiler, capable of supplying superheated steam at a temperature above 500° F. and pressure of 1000 pounds can be set up at the well and operated until the accumulation has been dissolved and passed into the tanks. This method is especially applicable to large wells that produce through tubing and are readily plugged with paraffin.[16]

Paraffin accumulations are removed from some gas-lift wells by injecting steam with the input gas, either into the annular space between the tubing and casing, or into the tubing. The steam is usually in-

As wells have drilled to constantly greater depths, increasingly higher temperatures have been encountered and it is now recognized that this condition will have important influences on oil and gas drilling and producing methods. Consequently, the accompanying report on this subject is of interest and value.

Because of its length the report is divided into two parts for publication. Part 1, which was published in the preceding issue, discussed temperatures affecting oil well drilling. Part 2, presented herewith, describes temperature affecting crude oil production and discusses the geothermal gradient present in Gulf Coast oil fields.

The complete report was presented under the title "Temperatures as Affecting Oil Well Drilling and Production." It was delivered at the Symposium on Temperature of the American Institute of Physics, held in New York City in early November. A fairly full report of the temperature symposium, including this and other papers that were presented, is to be published in book form by the Institute.

jected at monthly intervals, or more frequent if necessary. Although steam gives satisfactory results in certain wells in which the condensate from the steam does not form an emulsion with the oil, it is undesirable to use in wells where the water and oil emulsify and require additional heat treatment for their resolution. One of the most satisfactory methods of removing paraffin accumulations from the eductor tubing in gas-lift wells, consists of heating the input gas in small heaters with steam. These heaters are not used continuously but intermittently whenever the accumulation interferes with production.[17] Similar heaters are also used to reduce the viscosity of oil from wells producing a low gravity crude by the gas lift method.

In summing up the various methods used for prevention as well as removal of paraffin accumulation we might add that methods of prevention and removal are as varied as the types and kinds of accumulations.

(*b*) *Economic Importance of High Bottom-Hole Temperatures.*

Bottom-hole chokes have recently presented a new application in connection with the operation of gas wells, since their installation practically disposes of freezing difficulties by utilizing more effectively the high subsurface temperatures.

An example of this application of bottom-hole choking to prevent freezing of surface control equipment, which is a serious problem in the operation of high-pressure gas wells, is shown in a 3000-foot well at Holdenville, Oklahoma.[18] The open-flow capacity was 14,000 M.C.F. with closed-in pressure of 900 pounds. To supply the winter demand for gas, an elaborate system of surface heat exchangers were necessary. After the installation of a bottom-hole choke, the subsurface temperature of 185° F. was sufficient to prevent freezing and the surface heaters were consequently abandoned.

Laboratory investigation of the effect of high temperatures and pressures upon the phase relations of hydrocarbon mixtures as they occur in deep sands (below 7500 feet) have been found to be rather consistent, and the products condensed from these deep reservoirs are likewise found to have a high distillation end-point. The amount of condensate obtained from the gas in these deep horizons varies between the limits of 0.6 gallons to 3.5 gallons per thousand cubic feet and it is a common, but erroneous belief that a large portion of the crude oil at depths below 10,000 feet is in the vapor phase due to the extreme temperatures and pressures. Recent laboratory tests, however, indicate that it will require pressures well above 12,000 pounds or 15,000 pounds with a correspondingly high temperature before the major portion of a 36° gravity crude oil will pass into the vapor phase and these conditions would normally correspond to depths of wells in excess of 20,000 feet.[19]

In the Old Ocean field, Brazoria County, Texas, when distillate production is obtained from a 10,000-foot or 11,000-foot horizon, the wells have a closed-in surface pressure of 3800 pounds to 4000 pounds and an average temperature when flowing of 160° F. to 180° F. This extremely high surface temperature results from the bottom-hole temperature of 215° F.[20] and greatly increases the amount of distillate production when the gas-oil is allowed to expand to a lower temperature and pressure. Figure 9[21] illustrates the procedure employed in designing a surface regulating valve for high pressure distillate wells. Freezing is prevented by alternately regulating the pressure drop and using artificial means for increasing the temperature. Although the theoretical relation between temperature and pressure results in a ¾° F. drop in temperature for each 1 pound, absolute pressure drop in expanding gas, this chart is based on a decrease of 1° F. per each 1 pound drop in pressure to provide a certain safety factor in the design of a pressure regulating system.

The use of temperatures below zero degrees F. to increase distillate production is very effectively used by one major company. In their recycling process, the temperature of the gas is reduced to —15° F. without decreasing the well pressure, and requires a special brine solution to prevent freezing.[21] By this unique process, the distillate production has been increased 40 percent above the ordinary expansion method wherein the use of extreme temperature and pressure is disregarded.

In wells producing with a high gas/oil ratio having well head temperatures ranging from 120° F. to

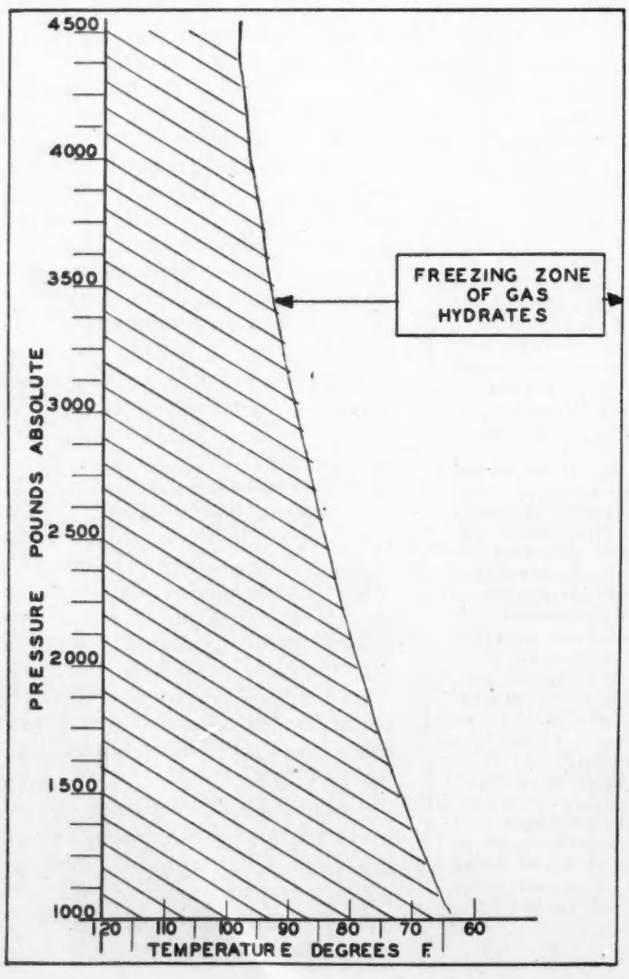


FIGURE 9

Procedure chart employed in designing surface regulating valve for high-pressure distillate wells.

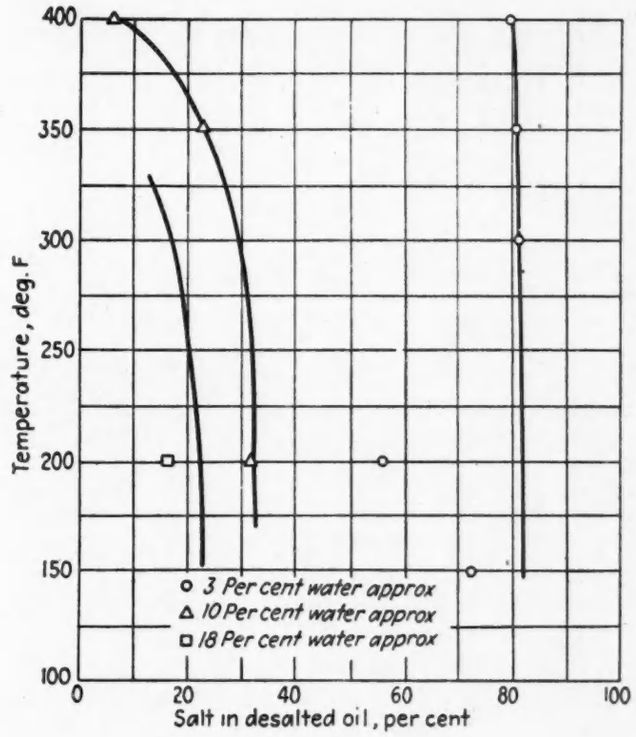


FIGURE 10

Percentage of salt in desalted oil at different temperatures.

140° F. where the fluid is subject to extreme foaming, very efficient gas separation is attained by reducing the flow line temperature 40° F. or 50° F. before the fluid enters the separator.

(*c*) *Heat Treating Crude Oil Emulsions.*

The percentage of water in emulsions that require treatment varies from 2 percent to 95 percent in extreme cases. Some of the water will ordinarily settle out on standing but usually about 25 percent of the water is so intimately united with the oil that treatment is necessary to effect a separation. Perhaps the most common type of treatment for water-oil is the use of heat alone, however, in a more stable emulsion, heat, together with a chemical inhibitor is necessary.[22] The temperatures to which the emulsion must be heated depends upon its character and will vary from 150° F. to 300° F. Heat treating tanks on "wet leases" are located between the well and the storage tanks and are usually equipped with steam coils. In this method, the water-oil enters through the bottom of the "gun-barrel" and on passing upward outside the steam coils, the separation occurs thence the clean oil is allowed to flow from the top of the gun barrel by gravity into the lease storage tanks.

Extensive investigations have been conducted by Gustav Egloff and associates in the removal of salts and salt water from crude oils by heat.[23] It is estimated that of the 1,200,000,000 barrels transported by pipe lines in 1937, approximately 50,000,000 pounds were salts and 10,000,000 barrels were water. This amount of salt is derived from both the salt water and crude oil. These figures fall well within the pipe line allowable of 1.5 percent B.S.&W. It is needless to mention the harmful effects from corrosion that appear in refineries that handle these salt-containing crude oils. These investigations by Egloff and associates deal primarily with the more efficient treatment of crude oil at the producing leases and include suggestions for several practical methods. In this paper only the use of heat and the addition of water will be considered. The effects of temperature and percentage of water added on salt removal are closely related. From Figure 10[23] Egloff and associates found that for the most efficient results, the addition of 10 percent by volume of water with a temperature of 400°F. would remove all but 5 percent of the salt in the crude oil. This, of course, is provided that the injection is made at the well and before the crude has "aged," permitting the formation of a more stable emulsion by the time the oil reaches the refinery. In the relationship of temperature and the percentage of water added, it was found that to obtain the same amount of salt removal for the addition of only 3 percent water, the temperature would have to be increased to 500° F. and vice versa. In general, the separation is poorest at 200° F. and best at 400° F. Figure 10 is the result of intensive laboratory investigation.

The Geothermal Gradient Present in the Gulf Coast Oil Fields

The American Petroleum Institute in 1936 inaugurated the first comprehensive study of the relation of geological structure in oil producing areas and their geothermal gradients. C. E. Van Orstrand, who was placed in charge of this program, and others, have since written and published several interesting papers[24,25,26] on this subject. As a general rule, it has been observed that temperature increases with depth, although the percent or degree increase varies between different areas and also varies within particular localities, depending upon the type of subsurface structure.

On the surface of the earth, not exceeding depths greater than 300 feet, there exists a slight variation in temperature due to solar heat, cooling effect of ground waters and adjacent bodies of water, forests, vegetation, rain, snow, etc. Since these effects on drilling and production of crude oil are of minor importance, discussion of these variations of temperature will not be included in this paper.

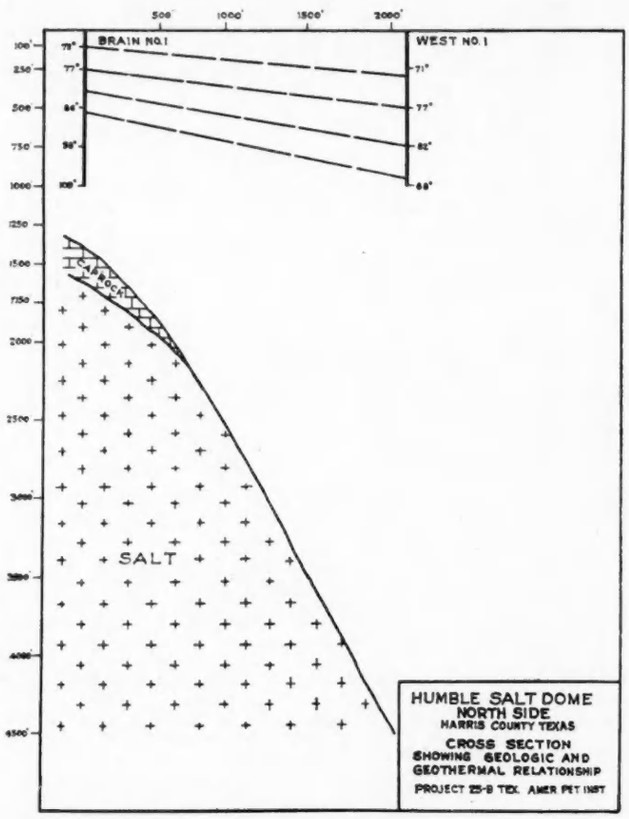
With regard to temperature and structure, a regional temperature map of West Central Texas would show a comparatively high temperature gradient along the Balcones-Mexia-Luling belt of faults.[27] Along this belt, temperatures would increase 1° F. for 43 feet of depth. West of this belt in the Central Mineral region, the increase would be 1° F. for every 50 feet or 60 feet of depth. Still further west and northwest, in

the Permian Basin, the rocks are much cooler, the rate of increase being less than 1° F. for every 100 feet. Investigations by Heald[27] of four salt domes, three in the Gulf Coast and one in the "interior salt dome province," have definitely shown that there is a more rapid increase in temperature with depth as the highest point of the dome is approached. The observed increase was somewhat cooler than the temperature along the Balcones fault zone with a rate of increase 1° F. for 50 feet of depth and the highest temperature was definitely associated with the salt dome itself. The decrease in temperature gradient farther and farther away from the dome was unmistakable. To make the situation even more interesting, the work has shown that temperatures at depths as shallow as 200 feet or 300 feet were significant and this has not proved true in other parts of Texas.

The apparent concentration of heat near salt domes may be partially explained by the fact that salt is an excellent conductor of heat, and assuming that the salt plug extends to depths in excess of 20,000 feet, the high temperature existing at this depth would be more readily transmitted through the salt mass than through adjacent sedimentary formations.

Unfortunately, data on the actual temperature of a buried salt mass are not available, however, examination of Figures 11 and 12 indicates[28] that the circulation of ground waters in contact with the salt mass account for the decrease in temperature per interval of depth along the flank and at a distance from the salt mass. These temperature gradient lines have a close similarity to the dip of the surrounding formations that have

FIGURE 11



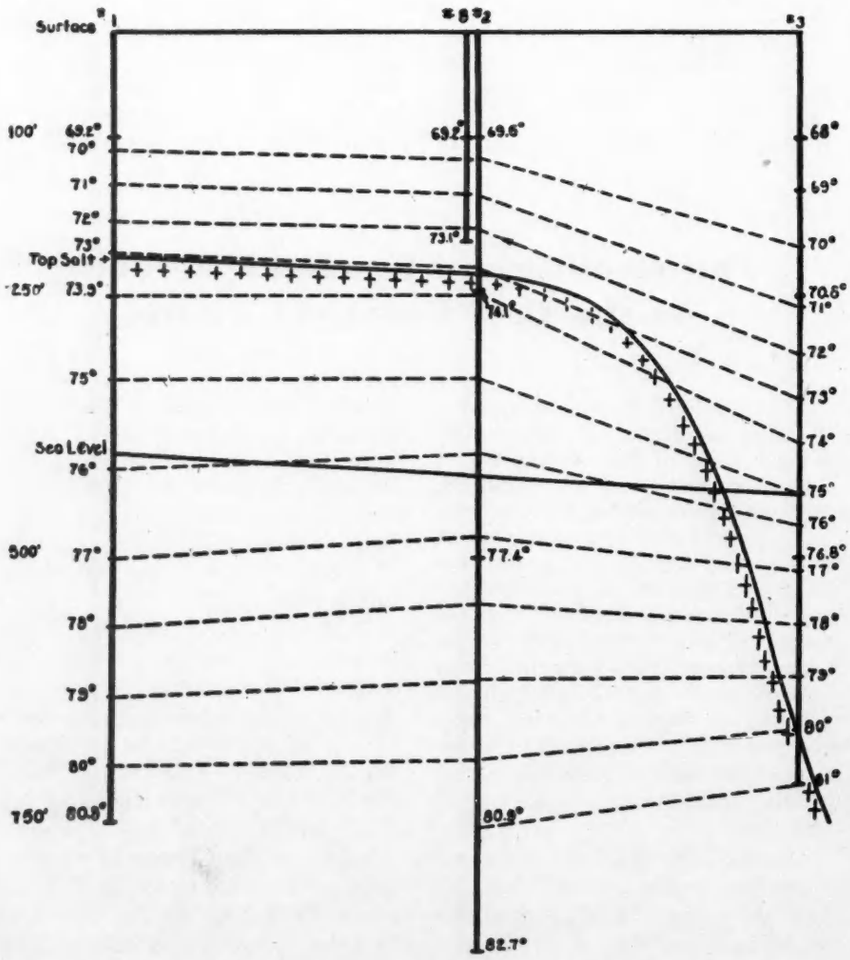


FIGURE 12

Cross section from north to south of the Grand Saline Salt Dome, Van Zandt County, Texas, showing relation of the isogeothermal surfaces of the geologic structure of the south side of the dome.

been uplifted due to the intrusion of the salt mass.

A recent survey of maximum temperature measurements made opposite the producing formation in 75 Texas oil fields is prepared in table form in Table 1, listing the producing formation, the sub-sea depth at which they are encountered, the average temperature, the geothermal gradient and the type of structure. Under the column "Geothermal Gradient," these figures were arrived at by assuming the average sea level temperature in Texas to be 80° F. and simply dividing the sub-sea depth by the average temperature less 80° F. This represents the depth in feet for an increase in temperature of 1° F. and can be used as an arbitrary figure in a comparison of the bottom-hole temperature with the type of geologic structure.

TABLE 1

Subsurface temperature of oil fields in Texas and Louisiana

Division and Field	Producing Formation	Sub-Sea Depth	Temp. °F.	*Geothermal Gradient Feet per 1° F. Increase	Type of Structure
East Texas					
East Texas	Woodbine	3300	146	50.00	Stratigraphic Trap
Navarro Crossing	Woodbine	5545	184	53.31	Piercement Type Salt Dome
Oakwood	Woodbine	5610	186	52.92	Anticline Faulted
Van	Woodbine	2425	136	43.30	Deep Seated Dome Faulted
Talco	Paluxy	3785	147	56.49	Anticline Faulted
Willow Springs	Glenn Rose	6925	221	49.11	Anticline Faulted
Gulf Coast					
Amelia	Frio	6480	164	77.14	Deep Seated Dome Faulted
Anahuac	Frio	7050	178	71.93	Deep Seated Dome Faulted
Cedar Point	Frio	5585	172	60.70	Deep Seated Dome Faulted
Danbury	Frio	5500	178	56.12	Piercement Type Salt Dome
Dickinson (8000')	Frio	8000	199	67.22	Deep Seated Dome Faulted
(9100')	Frio	9060	217	66.13	Part of Dickinson Structure:
(Gillock)	Frio	8750	207	68.89	Faulted Blocks
Friendswood	Frio	5800	164	69.04	Deep Seated Dome Faulted
Hastings	Frio	6000	170	66.66	Deep Seated Dome Faulted
Lovell Lake	Frio	7475	172	81.25	Deep Seated Dome Faulted
Pledger	Frio	6730	170	74.77	Deep Seated Dome Faulted
Roanoke	Frio	8390	196	72.32	Deep Seated Dome Faulted
Sugarland	Frio	3600	156	47.36	Semi-Deep Seated Piercement Type Dome
Thompsons	Frio	5250	162	64.02	Deep Seated Dome Faulted
Withers (Magnet)	Frio	5350	152	74.30	Elongated Deep Seated Faulted Dome
N. Crowley	Frio	8600	196	74.13	Deep Seated Dome Faulted
Vanderbilt	Frio	5530	166	64.30	Deep Seated Dome Faulted
Conroe	Cockfield	4900	172	53.26	Deep Seated Dome Faulted
Hardin	Cockfield	7610	196	65.60	Faulted Regional Uplift
Livingston	Cockfield	4115	158	52.75	Deep Seated Dome Faulted
Raccoon Bend	Cockfield	3850	156	50.65	Deep Seated Dome Faulted
Segno	Cockfield	5060	165	59.52	Deep Seated Dome Faulted
Tomball	Cockfield	5380	182	52.74	Deep Seated Dome Faulted
N. Cotton Lake	Marginulina	6145	156	80.85	Closure on Fault (Part of South Cotton Lake Structure)
S. Cotton Lake	Marginulina	6320	156	83.15	Elongated Faulted Regional Anticline
Hastings	Marginulina	5700	162	69.51	Deep Seated Dome Faulted
Roanoke	Marginulina	8630	201	71.32	Deep Seated Dome Faulted
N. Crowley	Marginulina	7970	188	73.79	Deep Seated Dome Faulted
N. Crowley	Miocene	7020	169	78.87	Deep Seated Dome Faulted
Thompsons	Miocene	3450	146	52.27	Deep Seated Dome Faulted
West Columbia	Miocene	2350	126	51.08	Piercement Type Salt Dome
Goose Creek	Miocene	2580	115	73.71	Deep Seated Dome Faulted
Cameron Meadows	Miocene	3925	139	66.52	Piercement Type Salt Dome
Barbers Hill	Miocene	4500	136	80.35	Piercement Type Salt Dome
Darrow, La	Fleming	5760	167	66.20	Piercement Type Salt Dome
Hull	Saline Bayou	4500	145	69.23	Piercement Type Dome
Katy	Saline Bayou	7000	170	77.77	Deep Seated Dome
Kittrell	Carrizo	1710	121	41.70	Piercement Type Salt Dome
Lake Hermitage	Miocene	3175	117	85.81	Piercement Type Salt Dome
Lake Washington	Cap Rock	1125	104	46.87	Piercement Type Salt Dome
N. Crowley	Discorbis	7945	186	74.95	Deep Seated Dome Faulted
Raccoon Bend	McElroy	3250	142	52.41	Deep Seated Dome Faulted
Roanoke	Heterostegina	7790	187	72.80	Deep Seated Dome Faulted
Segno	Wilcox	7540	221	53.47	Deep Seated Dome Faulted
S. Liberty	Saline Bayou	4925	142	79.43	Piercement Type Salt Dome
Southwest Texas					
Flour Bluff	Frio	6650	185	63.33	Deep Seated Dome Faulted
Greta	Frio	5750	177	59.27	Anticline Faulted
Heyser	Frio	5360	164	63.81	Sand Lenses on Anticline
Kelsey	Frio	4495	158	57.62	Anticline
Kelsey	Frio	5800	182	56.86	Anticline
Plymouth	Frio	5575	165	65.58	Monocline
Tom O'Connor	Frio	5800	177	59.79	Deep Seated Dome Faulted
Colorado	Cockfield	2330	145	35.84	Monocline–Lens
Dirks	Cockfield	3510	149	50.86	Faulted Anticline
Voss	Cockfield	3550	150	50.71	Faulted Monocline
Government Wells	McElroy	1750	128	36.45	Faulted Monocline
Loma Novia	McElroy	1950	138	33.62	Monocline–Lens
Lopez	McElroy	1610	124	36.59	Monocline Faulted
Seven Sisters	McElroy	1900	132	36.53	Monocline Faulted
Greta	Heterostegina	4150	143	65.87	Anticline Faulted
Hilbig	Edwards Lime	3175	116	88.19	Serpentine
Hilbig	Serpentine	2000	121	48.78	Serpentine
Kohler	Mirando	1825	137	32.01	Monocline
Lundell	McElroy	940	111	30.32	Monocline Faulted
N. Sweden	Pettus	4900	179	49.49	Faulted Anticline
O'Connor	Fleming	2950	121	71.95	Deep Seated Dome Faulted
Taft (4000')	Catahoula	3900	133	73.58	Deep Seated Dome Faulted
Taft (4900')	Heterostegina	4750	158	60.89	Deep Seated Dome Faulted
West Texas					
Hobbs	Permian Lime	500	98	27.77	Anticline
White and Baker	Permian Lime	5979	126	129.98	Anticline
Wink	Permian Lime	110	85	22.00	Anticline
North Texas					
Avoca	Palo Pinto Lime	1710	129	34.89	Anticline Faulted

* Based on assumed average Sea Level Temperature of Texas and Louisiana of 80° F.

Acknowledgment

The author wishes to extend his appreciation and thanks to Milton Mortimer Cooke, Petroleum Engineer for the writer, for his patient and valuable assistance in assembling and compiling data from many sources, and for many suggestions which were ultimately embodied in this paper.

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Acknowledgments for Illustrations

Figure 9—Reproduction of chart No. 2 prepared by Hanlon-Waters, Inc., Houston, Texas.

Figure 10—Reproduction of Figure 2, p. 54 of the 1938 Petroleum Transactions, A.I.M.M.E. "Desalting Crude Oils," by Gustav Egloff, Edwin F. Nelson, C. D. Maxutor and Charles Wirth.

Figure 11—Reproduction of Figure 21, p. 79, A.P.I. Prod. Bulletin 205, "Results of Deep Well Temperature Measurements in Texas," by E. M. Hawtof.

Figure 12—Reproduction of Figure 19, p. 78, A.P.I. Prod. Bulletin 205 (1930), "Results of Deep Well Temperature Meaasurements in Texas," by E. M. Hawtof.

Range and Application of Gas-Lift Methods

By E. C. BABSON
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PART 4—Conclusion

Parts 1, 2 and 3 of this paper, which was presented before the annual meeting of the American Petroleum Institute in Chicago in November, have been published in previous issues of The Oil Weekly.

Statements contained in the article are those of the author and should not be construed as the official action or opinion of the institute or of this magazine.

THE first cost of most intermitter installations is relatively small; emulsion trouble is usually not as severe as with the straight gas lift; and the intermitter can be made to produce volumes of liquid as large as 2,500 barrels per day. On the other hand, the sub-surface mechanism of the intermitter seldom can be repaired without pulling the tubing from the well.

If production from an intermitter is regarded as a series of slugs which flow into the filling chamber, and are pushed one at a time up the tubing, the pressure held against the formation should equal the height of the slug multiplied by the density of the fluid. Available data from wells in Kettleman Hills, Dominguez, and Santa Fe Springs (shown graphically in Figure 48) indicate that the actual pressures are much higher than the results of such calculations. Many of the pressures shown in Figure 48 were estimated from the static pressures and productivity indices of the wells; but several were determined by lowering a sub-surface-pressure gage into the well and allowing it to remain above the cross-over for several cycles. Minimum pressures shown on charts obtained in this manner were extrapolated to the standing valve by adding 0.10 pounds per square inch per foot. Such a result is somewhat lower than the average pressure against the formation, because the pressure outside the standing valve must increase to some extent while that valve is closed. Because of these assumptions and uncertainties, the pressures shown in Figure 48 are obviously approximations. The results obtained with sub-surface-pressure gages not only substantiate the pressures estimated from productivity data, but also indicate the reasons for these high pressures. A column of foam 1,000 feet to 2,000 feet high was found in the tubing of every well tested. These foam columns are caused by the formation gas rising through the liquid standing in the filling chamber. When the circulated gas is applied, it begins to extend this foam column up the tubing, until at some point the foam becomes so attenuated that it parts. The gas drives the upper portion out as a slug, while the lower portion gradually falls back down the tubing and imposes a pressure upon the standing valve.

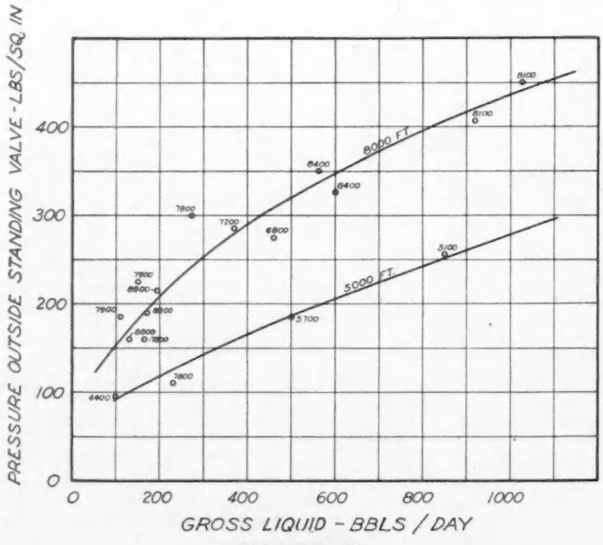

FIGURE 48
Performance of Intermitters; Pressures Corrected to 25 Pounds Per Square Inch Trap Pressure.

Gas-consumption data for intermitters in Texas, Oklahoma, Louisiana, and California are shown in Figure 49. Circulated-gas-liquid ratio was used, because data for wells with high formation gas-oil ratios indicate that they require as much circulated gas as those with low gas-oil ratios. The major portion of the formation gas blows through the liquid while it is standing in the filling chamber and, therefore does little useful work. The plotted data are fairly consistent at production rates higher than 400 barrels per day, but below this rate the gas consumption is so variable that it is unpredictable. The curve is drawn through the averages of the various groups of points.

It is believed that the intermitter is applicable primarily to the production of wells with medium static

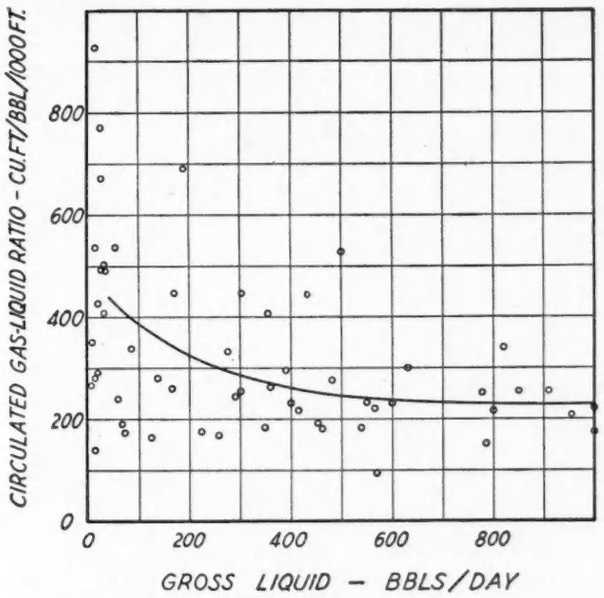

FIGURE 49
Gas Consumption of Intermitters

pressures and high productivity indices. Because the pressure held against the formation and the gas consumption apparently are unaffected by water, the intermitter will give satisfactory service in wet wells. In wells with low formation gas-oil ratios the intermitter requires less circulated gas than the straight gas lift and plunger lift; but, as the gas-oil ratio rises, the circulated-gas requirements of the last two decrease while the requirements of the intermitter remain almost constant. Low installation cost of intermitters largely has been responsible for their extensive use in very small producers. As the curves of Figure 48 cannot be extrapolated reliably to these low production rates, this practice cannot be evaluated by the methods used in this discussion.

Gas-Displacement Pumps

The gas-displacement pump is essentially an intermitter designed to function without a packer through the use of a full string of "macaroni" tubing hung inside conventional tubing. Because these changes alter the principle of operation and range of application of the device, it is considered as a separate method. A schematic diagram of one type of gas-displacement pump is shown in Figure 50. In this pump, gas is circulated through an intermitting valve at the surface and into the annular space between the macaroni and the tubing. The gas pressure opens the spring-loaded gas valve at the top of the filling chamber, and forces the fluid in the chamber up the macaroni tubing. When the surface intermitter shuts off the circulated gas, the sub-surface-gas valve closes against the annular space between the two tubing strings and opens into the casing, thus permitting any remaining pressure in the chamber to escape into the casing. The standing valve then opens, and fluid from the well flows into the chamber. Any fluid which is not blown out of the macaroni string is held on the check valve in the tail-piece. Formation gas is produced through the casing as in conventional pumping installations.

The design of this pump offers positive assurance against pressure being held on the formation as a result of slippage or falling back of the liquid which is being lifted. On the other hand, the full string of macaroni tubing decreases the fluid-carrying capacity, increases the injection pressure, and increases the total installation cost, as compared with the intermitter.

Gas-displacement pumps have been used in oil fields for a number of years, more than 100 installations having been reported in various parts of the world. There are at present 25 of these pumps in operation in the Brea-Olinda field of California, at depths of from 4,000 feet to 5,000 feet. It has been found necessary to pull the sub-surface-gas valves, which are run on the macaroni tubing, approximately once a year. The practice of one of the operators has been to use gas pumps in the clean wells and sucker-rod pumps in the wet ones, because the sucker-rod pumps do not emulsify the oil and water as severely as the gas pumps. As a result of this policy, gas pumps have been removed from several wells during the past few years, and rod pumps installed. The rates of production were not affected noticeably by the change in equipment, even at rates of production as high as 200 barrels per day. The absence of a difference between rates of production from the two types of pumps indicates that the pressure held against the formation was low; but it is impossible to establish the actual pressures, because the productivity characteristics of the wells are not known.

After careful adjustment of the equipment, the average circulated gas-liquid ratio for 11 wells in the Brea-Olinda field was 330 cubic feet per barrel per 1,000 feet of depth. For normal operations, the gas

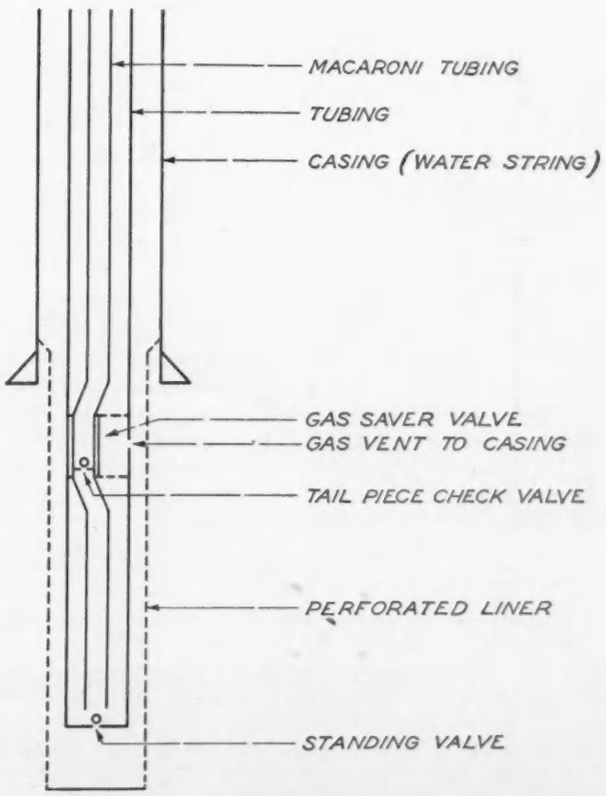

FIGURE 50
Schematic Diagram of a Gas-Displacement Pump

consumption probably would be somewhat higher than this figure.

The above discussion indicates that the gas-displacement pump is directly competitive with sucker-rod and hydraulic pumps. Because of the limited liquid- and gas-carrying capacities of the tubing strings, the gas pump is applicable primarily to wells producing less than 200 barrels per day. At higher rates of production, the intermitter probably will give more satisfactory service.

General Discussion

The performance of the various types of gas lift in actual wells can be predicted from the approximate operating characteristics previously established. The procedure involves, first, the plotting of the relation between producing sub-surface pressure and production for the well in question. Next, the characteristic curve for the type of equipment in question is plotted on the same sheet of paper. The intersection of the two curves gives the rate of production to be expected. Once the rate of production has been established, the gas requirements can be determined from the gas-consumption curves. In order to illustrate this procedure, an example is given hereinafter.

An estimate will be made of the performance of the three-inch gas lift at 25 pounds per square inch tubing pressure in a well of the following characteristics:

Depth ..... 5,000 feet
Static pressure ..... 500 pounds per square inch
Productivity index (constant) . 1.5 barrels per day per pound per square inch
Formation gas-oil ratio..... 1,000 cubic feet per barrel

The productivity curve for this well is a straight line passing through 500 on the pressure axis and 1.5 times 500, or 750 on the production axis. In Figure 51 this

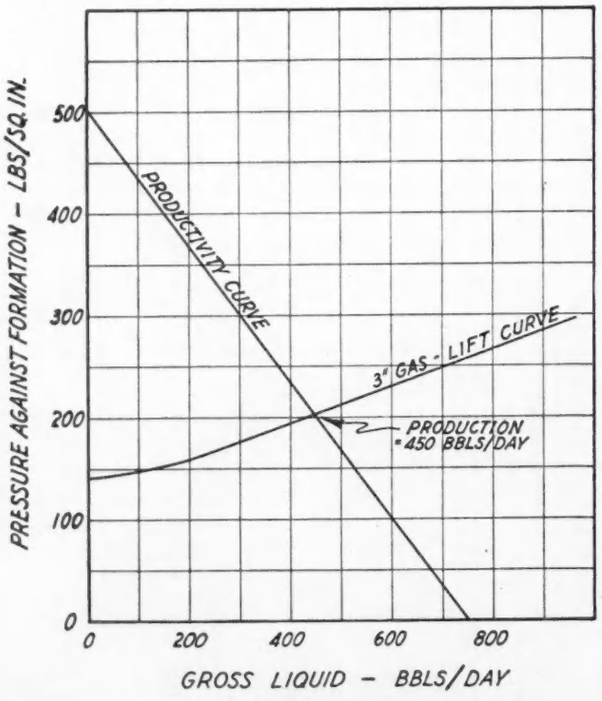

FIGURE 51

Estimation of the Performance of 3-Inch Gas Lift in a Well of the Following Characteristics: Depth, 5,000 Feet; Static Pressure, 500 Pounds Per Square Inch; Productivity Index 1.5 Barrels Per Day Per Pound Per Square Inch; Assuming 25 Pounds Per Square Inch Tubing Pressure.

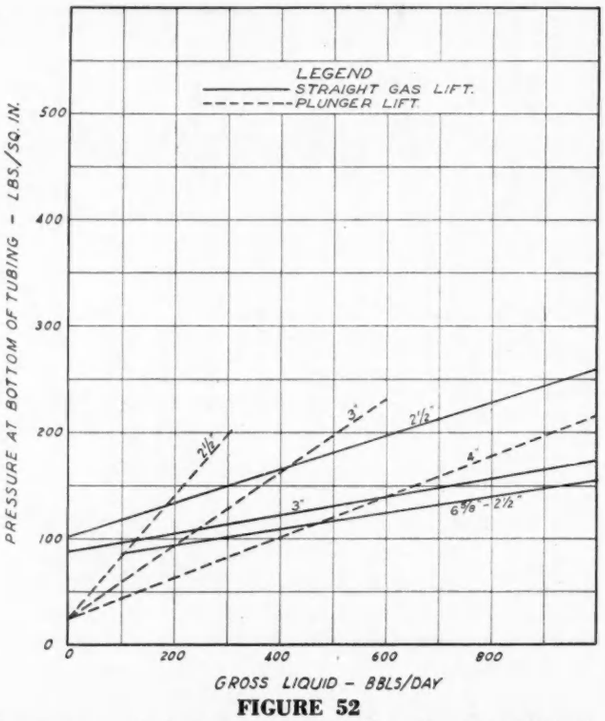

FIGURE 52

Comparison of Performance of Various Gas-Lift Methods; 3,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.

line is plotted together with the characteristic curve for 3-inch gas lift at 5,000 feet and 25 pounds per square inch tubing pressure. The two curves intersect at a production rate of 450 barrels per day. From Figure 29 it can be seen that the gas consumption for the 3-inch gas lift at 450 barrels per day is approximately 1,700 M.C.F. per day. As the well will produce 450 M.C.F. per day of formation gas, the circulated-gas requirement will be 1,700 minus 450, or 1,250 M.C.F. per day—which corresponds to a circulated-gas-liquid ratio of 2,800 cubic feet per barrel.

In order to facilitate comparison, the pressures held against the formation by the different methods at a tubing pressure of 25 pounds per square inch are shown in Figures 52, 53, and 54, for 3,000-, 5,000-, and 8,000-foot wells, respectively; whereas the gas-consumption curves for the same depths are shown in Figures 55, 56, and 57. These graphs summarize the results of this investigation far more effectively than can be done in words.

In Figures 52, 53, and 54 the curves for the intermitter and 2½-inch, 3-inch, 6⅝-inch and 8⅝-inch straight gas lift are a series of slightly-divergent lines which are crossed by the plunger-lift curves. The relative positions of the various curves are not changed appreciably by changes in depth, except that the intermitter does not compare as favorably with the 6⅝-inch gas lift at 8,000 feet as it does at 5,000 feet. The advantages of the plunger lift as a method for producing wells with small potentials are evident.

The gas-consumption curves in Figures 55, 56, and 57 show that the straight gas lift compares more favorably with the intermitter and plunger lift at 8,000 feet than it does at 3,000 feet. This is due to the fundamental difference between continuous and intermittent methods. When the liquid is produced in slugs, the gas consumption is roughly proportional to the depth; but when it is produced by continuous flow, the gas consumption is not affected so greatly

"WE had an Oklahoma City well with 259 ft. of open hole below the 7-in. shoe at 6122 ft. To plug back, we lowered tubing to 6113 ft. and pumped in water for over two hours without returns.

"Then we mixed 150 sacks of Unaflo Oil Well Cement into a heavy slurry, pumped it into the tubing, and followed with 175 cubic ft. of water. That took us only 19 minutes. Then we lifted tubing 789 ft. by pulling 12 doubles and one single, and flushed. We squeezed at 1450 lb. pressure.

"After the squeeze, we had 220 ft. of Unaflo left in the casing. One hour and 44 minutes later, we lowered tubing 220 ft. into this cement, reversed, and washed it out in 16 minutes.

"We got the top of the cement exactly where we wanted it. And no costly drilling was necessary! A perfect job!"

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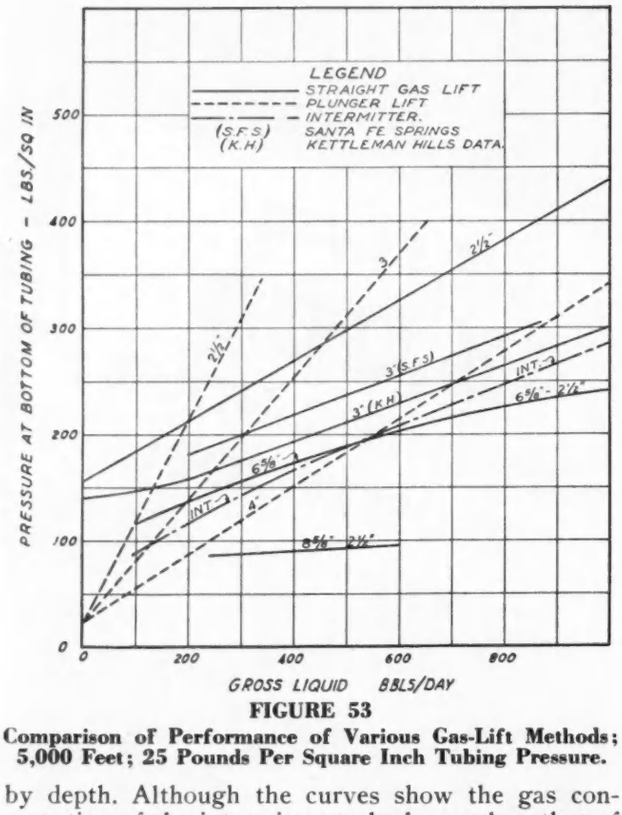


FIGURE 53

Comparison of Performance of Various Gas-Lift Methods; 5,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.

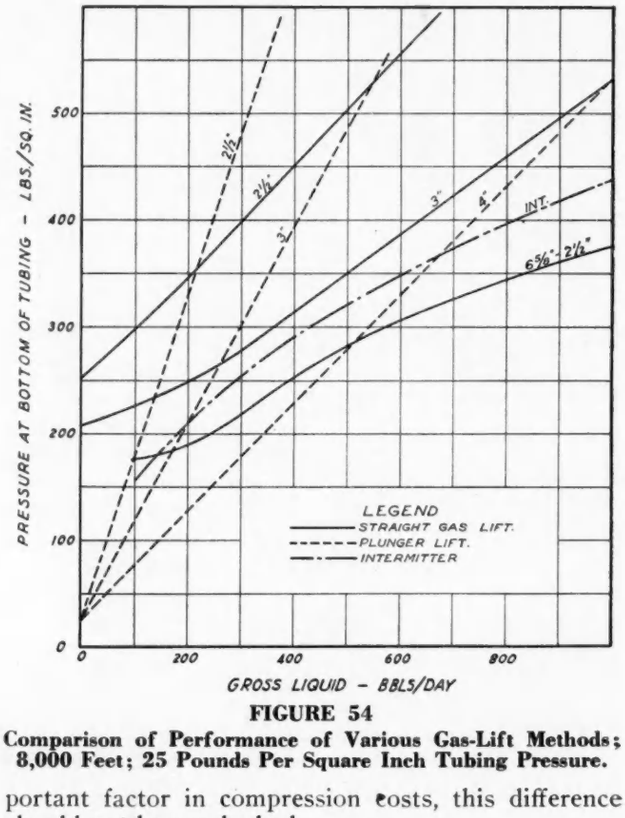


FIGURE 54

Comparison of Performance of Various Gas-Lift Methods; 8,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.

by depth. Although the curves show the gas consumption of the intermitter to be lower than that of the plunger lift, two modifying factors must be considered. First, the intermitter curves show the circulated-gas-liquid ratio, whereas the plunger-lift curves show the gross gas-liquid ratio. Any formation-gas production will tend to close the gap. Second, the injection pressure for the intermitter is usually as high as, or higher than, that for the straight gas lift; but the injection pressure for the plunger lift is slightly lower than the pressure at the bottom of the tubing—which approaches zero at low rates of production. Inasmuch as pressure is an important factor in compression costs, this difference should not be overlooked.

One method of evaluating the relative economy of the various methods is illustrated in Figure 58. In this illustration cumulative cost in dollars is plotted against cumulative production for the 3-inch straight gas lift, the 3-inch plunger lift, and the intermitter—assuming the well characteristics described in Figure 51. Approximate installation cost of each device is shown as the intercept of the curve with the cost axis, and the cost of compressing the gas necessary to lift 1 barrel of oil is shown as the slope of the curve. The installation costs shown are relative—the

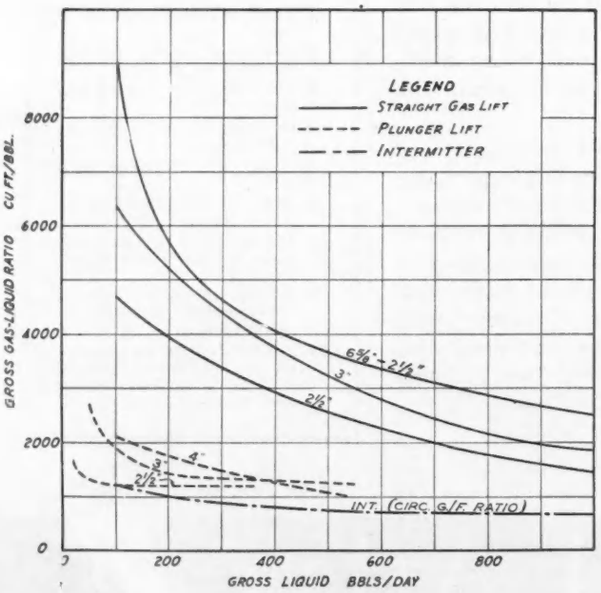


FIGURE 55

Comparison of Gas Consumption for Various Gas-Lift Methods; 3,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.

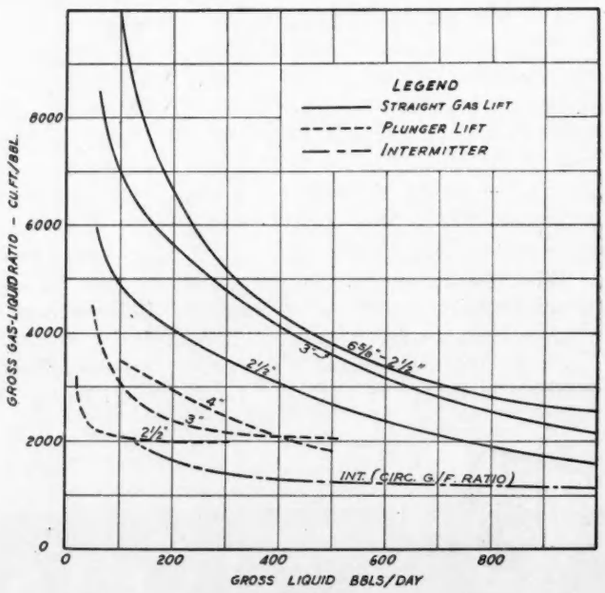
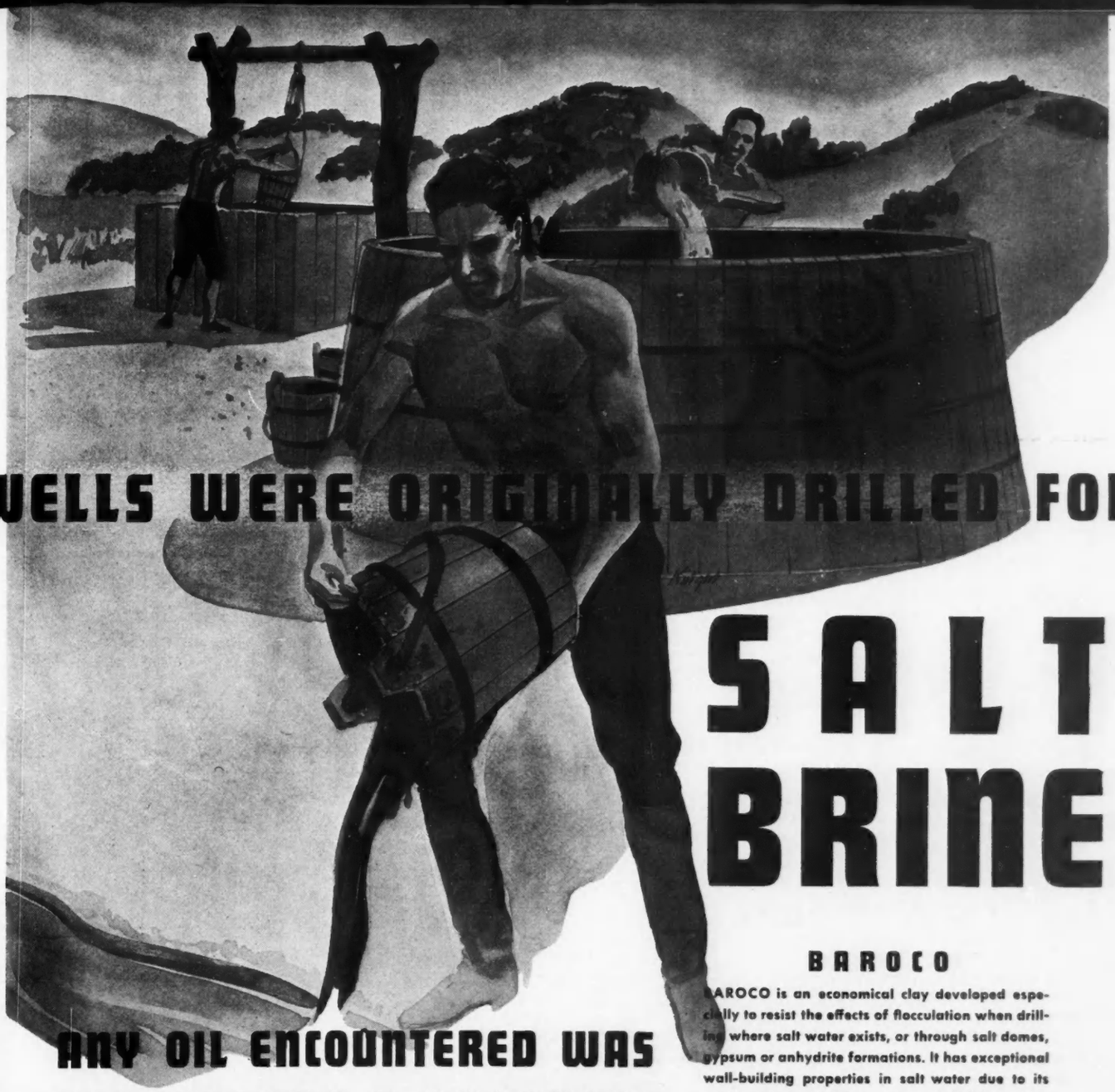


FIGURE 56

Comparison of Gas Consumption for Various Gas-Lift Methods; 5,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.



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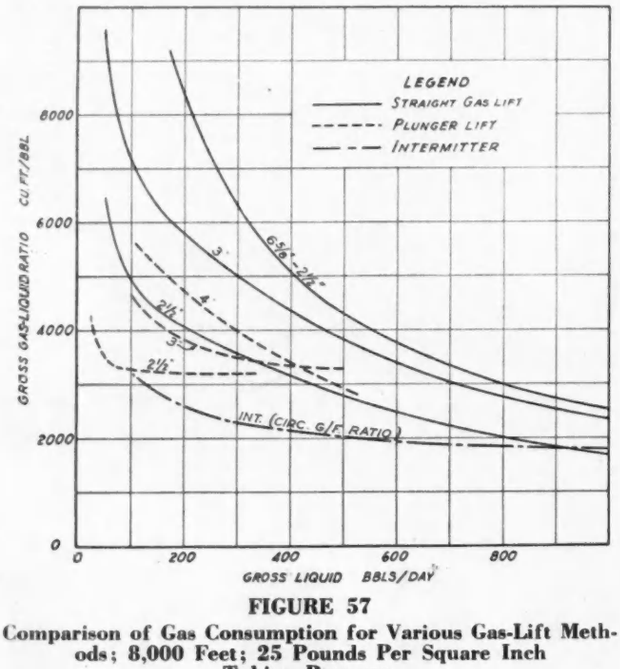

FIGURE 57

Comparison of Gas Consumption for Various Gas-Lift Methods; 8,000 Feet; 25 Pounds Per Square Inch Tubing Pressure.

first cost of the straight gas lift being regarded as zero. By using the method illustrated in Figure 51, the production rates for the various methods were evaluated, and the gas requirements corresponding to these production rates were read from Figure 56.

TABLE 5

Estimation of Performance of Various Gas-Lift Methods in an Assumed Well

METHOD	Production (Barrels Per Day)	Gross Gas-Liquid Ratio (Cubic Feet Per Barrel)	Circulated Gas-Liquid Ratio (Cubic Feet Per Barrel)	Compression Cost (Cents per Barrel)
3-inch gas lift	450	3,800	2,800	3.14
3-inch plunger lift	385	2,100	1,100	1.23
Intermitter	475	....	1,250	1.40

Results of these calculations, as shown in Table 5, were used to calculate the curves of Figure 58 by assuming no decline in production. Although the operating costs shown are lower for the intermitter and the plunger lift than for the straight gas lift, 87,000 barrels of oil must be produced before the cumulative cost of the straight gas lift will equal that of the intermitter. Unless a long life is expected or the additional production greatly is desired, the installation of an intermitter does not seem justified for this well. The plunger lift is not satisfactory, either from the standpoint of production or of cumulative cost.

Ranges of Application of Various Gas-Lift Methods

It is impossible to establish rigid ranges of application for the various gas-lift methods, because the performance desired from a well is dependent upon many variables—such as lease requirements, proration schedules, budget provisions, compressor facilities, demand for a particular grade of oil, and competitive conditions.

However, in order to illustrate a point of view and to summarize approximately the writer's opinions on the subject, some very generalized ranges of application—representing good practice on a large, relatively non-competitive lease—are shown in Figure 59. No consideration has been given to curtailment or to conservation of reservoir energy, although both of these factors materially might alter the conclusions. The areas shown are not predicated upon either maximum production or minimum gas consumption, but upon a compromise between the two.

Ranges of application are shown for a depth of 5,000 feet at formation gas-oil ratios of 300, 1,000, and 3,000 cubic feet per barrel, and for a depth of 8,000 feet at a formation gas-oil ratio of 1,000 cubic feet per barrel. The field of application of the gas-displacement pumps at the lower gas-oil ratios arbitrarily has been placed in the area where the absolute potential is less than 200 barrels per day, and the static pressure is in excess of 100 pounds per square inch. The remainder of the unfilled area is given to the conventional pump; because, under these conditions, the conventional pump will produce fluid at a higher rate. The area assigned to the gas pump has been expanded at the highest gas-oil ratio, because this pump should be able to produce foam more effectively than the conventional pump. As the gas-oil ratio increases, the area assigned to the plunger lift expands at the expense of the straight gas lift and the gas pump; whereas the area allotted to both tubing- and casing-flow gas lift expands at the expense of the intermitter. Both of the straight gas-lift methods are confined to very restricted areas at the highest gas-oil ratio, because a well with a 3,000 gas-oil ratio will flow at a low reservoir pressure. At higher gas-oil ratios, the plunger lift and the gas pump are the only feasible gas-lift methods.

At 8,000 feet the range of application of the straight

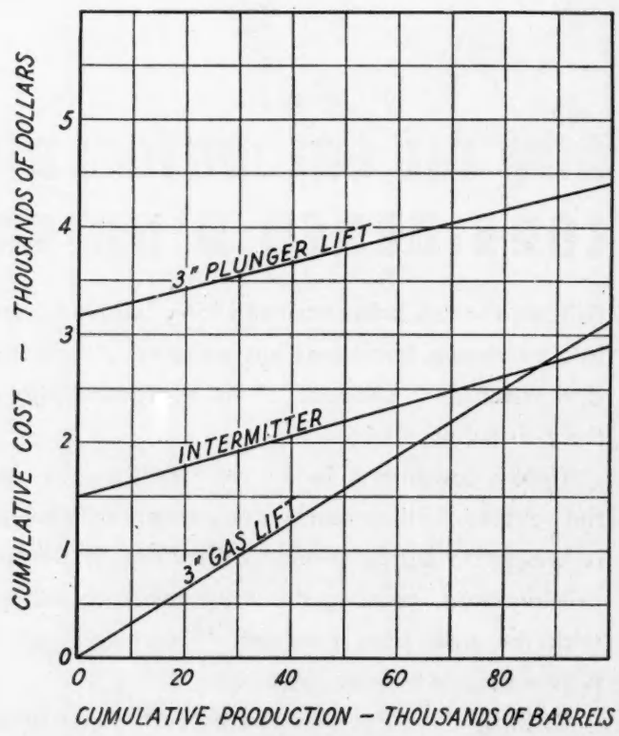

FIGURE 58

Relative Production Cost of Various Gas-Lift Methods in a Well of the Following Characteristics: Depth, 5,000 Feet; Static Pressure, 500 Pounds Per Square Inch; Productivity Index, 1.5 Barrels Per Day Per Pound Per Square Inch; Formation Gas-Oil Ratio, 1,000 Cubic Feet Per Barrel; Assuming 25 Pounds Per Square Inch Tubing Pressure.

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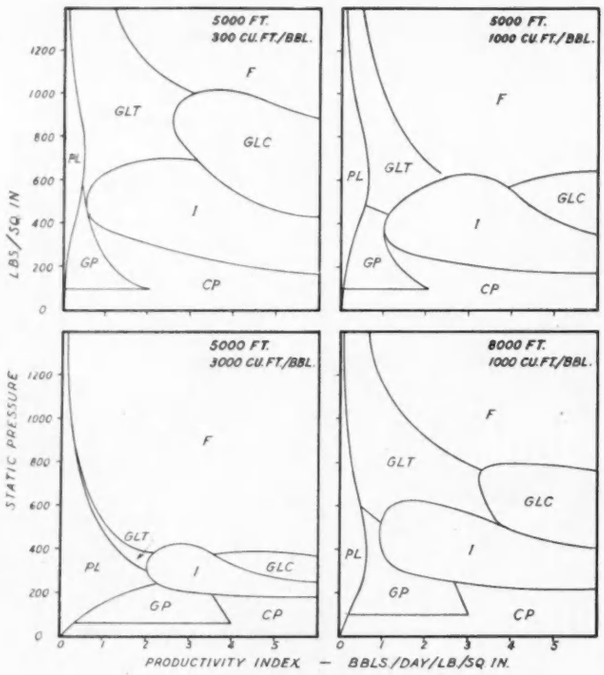

FIGURE 59

Ranges of Application of Gas-Lift Methods; Less than 10 Percent Water; Depth and Formation Gas-Oil Ratio Shown at Top of Each Chart. *F*=flowing; *GLT*=tubing gas lift; *GLC*=casing gas lift; *CP*=conventional pump; *PL*=plunger lift; *I*=intermitter; *GP*=gas pump.

gas lift has expanded at the expense of the plunger lift and the intermitter; whereas the plunger-lift area has expanded at the expense of the gas pump, and the gas pump at the expense of the conventional pump. No diagrams are shown for wet wells, because the operating characteristics of the various methods in such wells have not been evaluated; but it is believed that the conventional-pump region will expand at the expense of the gas pump and intermitter—which, in turn, will expand at the expense of the straight gas-lift and flowing areas.

The ranges of application shown in Figure 59 are applicable to wells which are not curtailed severely. Under the type of curtailment which prevails in Texas, the ranges of application differ appreciably from those given. It has been shown that, under some conditions, the intermitter holds a high pressure against the producing formation; but, under drastic curtailment, this characteristic often is of little consequence. The low cost of installation and operation justifies the use of this device; and it, therefore, encroaches upon the gas pump, plunger lift, and straight gas lift. In so-called "marginal" wells, however, it may be necessary to reduce the pressure held against the formation to a minimum. Although from the data available it is impossible to establish the performance of the intermitter at very low rates of production, the possibility of appreciable pressures being held against the formation should be considered—and, if possible, evaluated. If the static pressure and productivity index of a well are known, the pressure held against the formation by any production method can be estimated from the rate of production obtained. In this manner the performance of intermitters in small wells in a given field can be estimated from a few tests. From a knowledge of this performance and of the characteristics of the wells to be produced, the additional production to be obtained by a plunger lift or gas pump can be weighed against against the installation cost of these devices.

Conclusion

In conclusion, the author wishes to emphasize that it is impossible to formulate universal rules for determining the ranges of application of gas-lift methods, because so many factors influence the selection of the proper production method for a well. However, the operating characteristics of various gas-lift methods and a procedure for utilizing these results have been presented graphically in the hope of aiding the operator in his selection of the production method best suited to a given well or group.

Acknowledgments

It is impossible to acknowledge in detail all the assistance received from various organizations and individuals. The author wishes, however, to asknowledge particularly the assistance of W. E. Gilbert, Shell Oil Company, who suggested this investigation and whose continued assistance has been helpful; E. N. Merrill, consulting production engineer, Los Angeles, who originated many of the methods used; D. L. Caldwell, Barnsdall Oil Company, who was instrumental in obtaining much of the data; and Howard C. Pyle and P. H. Jones, Union Oil Company, who gave invaluable assistance.

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Predicting Wet Gas Recovery In Recycling Operations

By JUDSON S. SWEARINGEN, Chemical Engineer

THE prediction of ultimate recovery of condensate from a producing horizon where the residue gas is returned to the formation through another well is dependent upon an estimate of the area displaced by the dry gas in this so-called "recycling" operation, before the dry gas reaches the producing well. Other associated questions are: how rapidly may the producing well be expected to dry up after the dry gas reaches it; and what will be the shape and position of the dry gas area?

The lighter dry gas has a tendency to spread out in the upper layers of the formation leaving the heavier wet gas in the lower part of the stratum. The permeability of the sand and the viscosity and difference in densities of the gases affect the rate of this spreading by convection. A preliminary calculation indicates that this effect is not sufficiently pronounced as to be of concern in most cases. Work is now in progress determining bottom-hole densities for more accurately predicting it and will be reported at a later date.

The problem, therefore, reduces itself to a study of two-dimensional displacement of the wet gas layer by the injected dry gas. The extent and position of these dry gas areas have been determined for several analytical shapes by the use of electrical models and presented here in usable form together with an explanation of their use.

It has been found that the movement of high pressure gas through sand is linearly proportional to the pressure differential causing the movement, i.e., n in the expression

$$R = k\,(P)^n$$

where R = rate of flow
and P = pressure differential between well bore and formation

is practically unity. The deviation of n from unity occurs at high gas velocities such as exists only near the well bore when the well is producing at high rate. Many careful tests show n to vary only between unity and 0.96[1] in high-pressure wells.

Likewise in the flow of electric current through conductors, electrolytic solutions included, an exactly parallel relation of flow to potential difference exists, namely that they also vary linearly with each other. Therefore electrical models where a layer of electrolyte whose ion content represents the gas content of the sand will respond to potential differences in exactly the same manner in which gas in the formation will respond to pressure differences. In this work numerous electrical models of fields of various shapes and well positions were made and tested, and successive patterns of the "dry gas" area were made to scale.

Such applications of electrical models is not new, Langmuir[2] used this method for determining the equivalent of irregular shapes for heat transfer. Wyckoff[3] and his associates used the method for determining displacement figures in water flooding. Muskat[4] gave a very complete mathematical treatment of the problem in 1934.

The electrical apparatus for the present work consisted essentially of half-cells representing wells and a layer of electrolyte solution on a glass plate and made firm by a 2 percent agar content, the film representing the gas-saturated horizon. This agar solution was protected from drying by a covering sheet of thin mica. A small hole was drilled in the mica for each "well location."

The half-cells each consisted of a copper electrode, a beaker of solution and a glass tube. The glass tube extended over the edge of the beaker, then bent down, then out with its outer and somewhat constricted end bent down and placed immediately upon a hole in the mica covering of the agar "producing zone." This tube was filled with the same solution as in the beaker to which was added 2 percent of agar to prevent flowing. The cathodic half-cell contained tenth molal zinc-ammonia chloride and the anodic half-cell, representing the injection well, contained the deep blue copper-ammonia chloride, also tenth molal. The agar "zone" consisted of tenth molal zinc-ammonia chloride containing 2 percent agar.

Zinc- and copper-ammonia chlo-

THE discovery in recent years of a number of fields that yield a new type of petroleum production, known to the industry as condensate or distillate, has created new operating problems. Of particular importance at this time, due to the newness of such fields, is the estimation of ultimate yields, especially in view of the belief it is advisable to install recycling plants, which necessitates additional investment.

The accompanying article, which discusses this phase, presents principles that should influence the selection of well locations and the plan for future operation in an important way if maximum recovery of liquid is to be realized.

The work upon which the conclusions are based was sponsored by John F. Camp, head of Camp Production Company of San Antonio, who discovered the Stratton field of Nueces County, Texas, one of the early distillate fields.

[1]Unpublished data by Dr. F. V. L. Patten, Director of Production, Texas Railroad Commission.

[2]Langmuir, Adams and Meikle: *Trans. Amer. Electrochem. Soc.* 24, 53 (1913).

[3]*Trans. A. I. M. E., Petr. Div.*, 103, 219 (1933).

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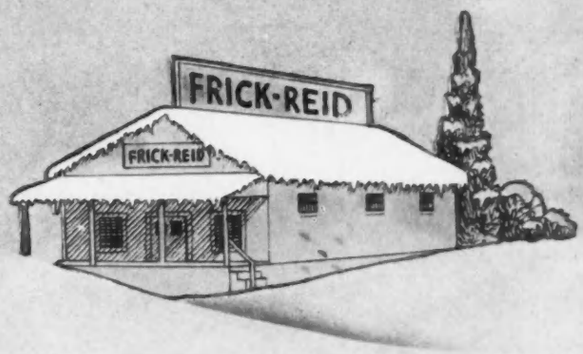
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rides were especially suitable for this purpose because the transference numbers of these complex ions are practically the same. If these transference numbers were different, say the copper-ammonia ion moved with less resistance than the zinc-ammonia ion, that would be a case analogous to repressuring a condensate field with a more limpid gas and the resulting areas would be smaller. The limpid gas would tend to "reach" for the producing well.

In order to minimize the effect of diffusion, as high a current was used as was possible without raising the temperature of the agar "zone." The thinness of the agar film and its intimate contact with the glass plate and mica were of great advantage in stabilizing its temperature. A large part of the voltage drop was in the agar tubes and they were perceptibly warmed.

The experiments were carried out as follows. The glass plate carrying the agar "zone" was fixed in a horizontal position 4 inches above the table. A small wire loop to be used as a peep hole was placed 10 inches above the glass plate. By looking through this peep hole the outline of the blue area representing displaced wet gas was easily traced upon a sheet of paper placed on the table directly below the glass. Successive outlines were made and the time of each was recorded.

The results obtained with various shapes of "zones" are given in Figure 1.

The numbers in Figure 1 represent the ratios of the areas recycled, to a square whose side is the well spacing. For instance, if the pair of wells are one mile apart and the constant from the table is 0.80, it means that eight-tenths of a square mile is recycled, i.e., displaced. However, the shape and position of this area is defined by the appropriate figure.

Before full use of these constants can be made, three factors have to be elucidated. They are:

(1) The effect of irregularities in the horizon, as thickness, porosity, etc.

(2) The adaptation of the fundamental figures given here to different or more complicated shapes and well locations.

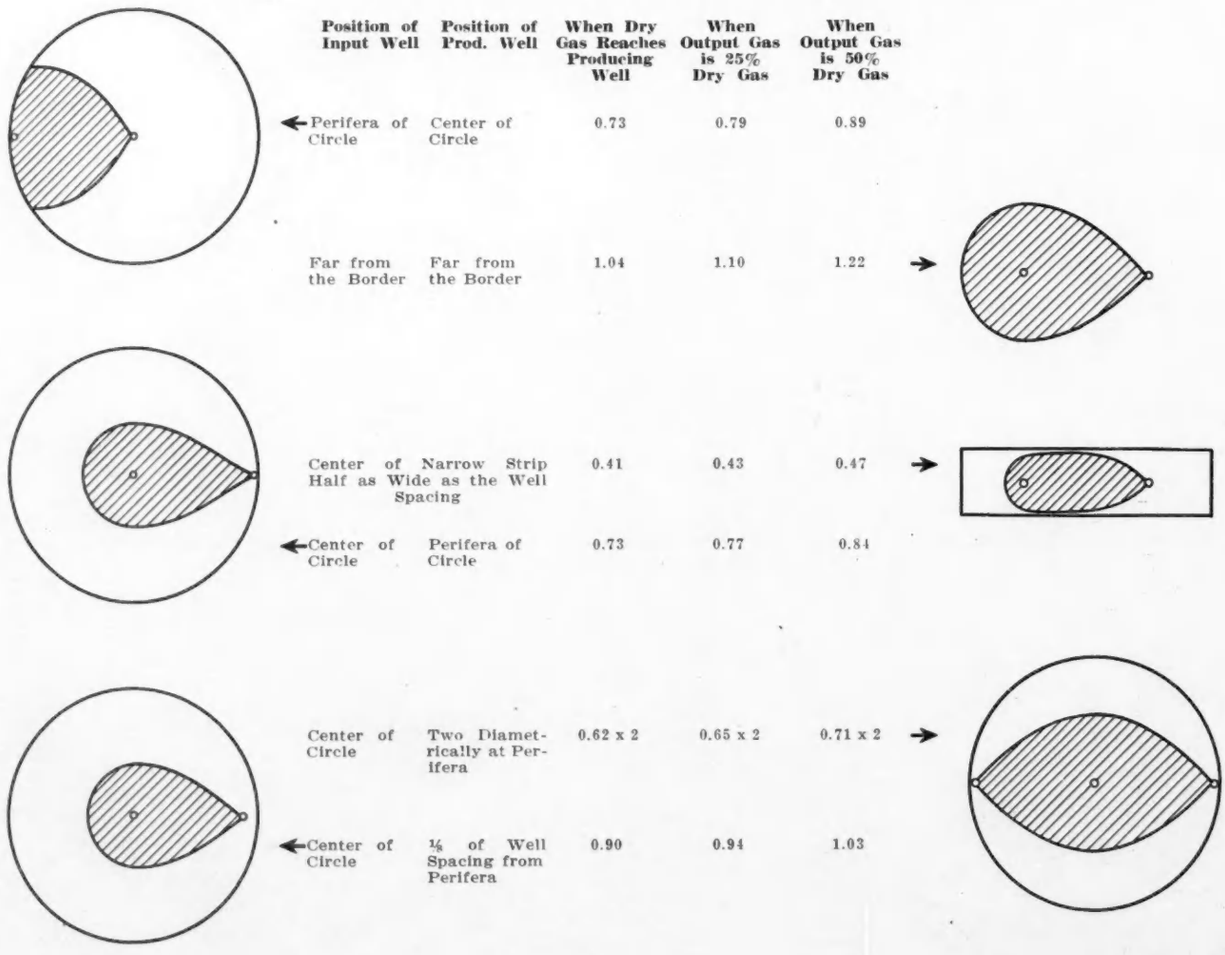
(3) The application to cases modified by previous recycling operations.

(1) Formation Irregularities

The thickness and condition of the producing horizon is never completely known. Fortunately it has a smaller effect than may be at first supposed. For example, a circular lensed stratum would give practically the same displacement pattern as an equivalent circular

FIGURE 1

Displaced area expressed as a fraction of a square whose side is the well spacing



Position of Input Well	Position of Prod. Well	When Dry Gas Reaches Producing Well	When Output Gas is 25% Dry Gas	When Output Gas is 50% Dry Gas
← Perifera of Circle	Center of Circle	0.73	0.79	0.89
Far from the Border	Far from the Border	1.04	1.10	1.22
Center of Narrow Strip Half as Wide as the Well Spacing		0.41	0.43	0.47
← Center of Circle	Perifera of Circle	0.73	0.77	0.84
Center of Circle	Two Diametrically at Perifera	0.62 x 2	0.65 x 2	0.71 x 2
← Center of Circle	⅛ of Well Spacing from Perifera	0.90	0.94	1.03

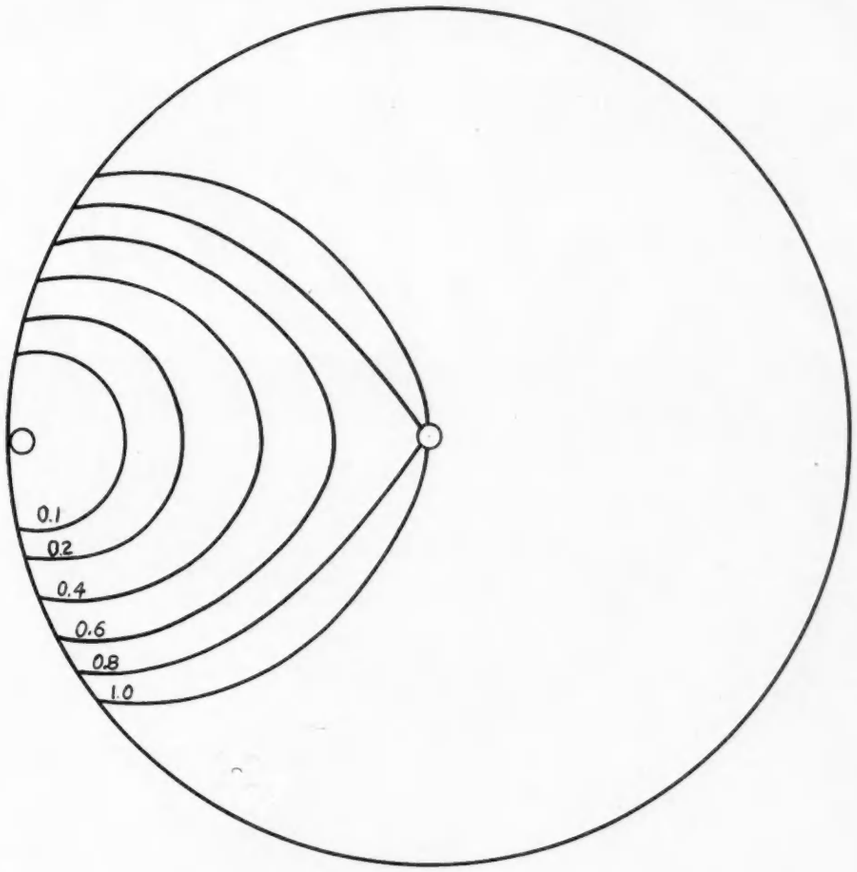


FIGURE 2

Input well at perifera, producing well at center of circle.

stratum of uniform thickness and somewhat smaller diameter. Thin places and also places with low porosity but only proportionately lower permeability, unless of large dimensions, will modify the equivalent figure only slightly. To be sure a large, practically impervious area should be recognized as constituting a boundary to the field. These thin places or places with fewer but not smaller voids are emptied at as rapid or even at a more rapid rate than the rest and are in a different class from the tight sands which have a reasonable porosity but whose permeability is low.

A study of these tight sand spots may be attacked by considering a simple case. Assume the gas to have two available routes for a relatively short distance, both of which have the same porosity. One route is through sand of half the permeability as the other but assume there is twice as much of it so that equal amounts take each route. Dry gas will reach the lower end of the high permeability path first. Then until the lower permeability path is displaced, the gas mixture emerging from below will be half dry. Now assume that this half-and-half mixture enters another dual passageway identical with the first. The exit gas from these latter two paths will be half wet gas and the other half will soon be half dry gas, i.e., the mixture will be one-fourth dry; later it will be half dry and finally all dry. A third similar path would produce gas first one-eighth dry, then one-fourth, one-half, and finally all dry. The ultimate result according to this geometrical series is that a trace of dry gas, a forerunner so to speak, reaches the producing well early but its total concentration remains small until the pure dry gas is near. The illustration is based on two paths or multiple paths. Actually multiple paths even exist around each sand grain. The gas velocity in the middle of each little opening or channel is approximately twice the average velocity in that same opening. The divergence from actuality is great only if the low permeability areas are few and large, or if the difference in per-

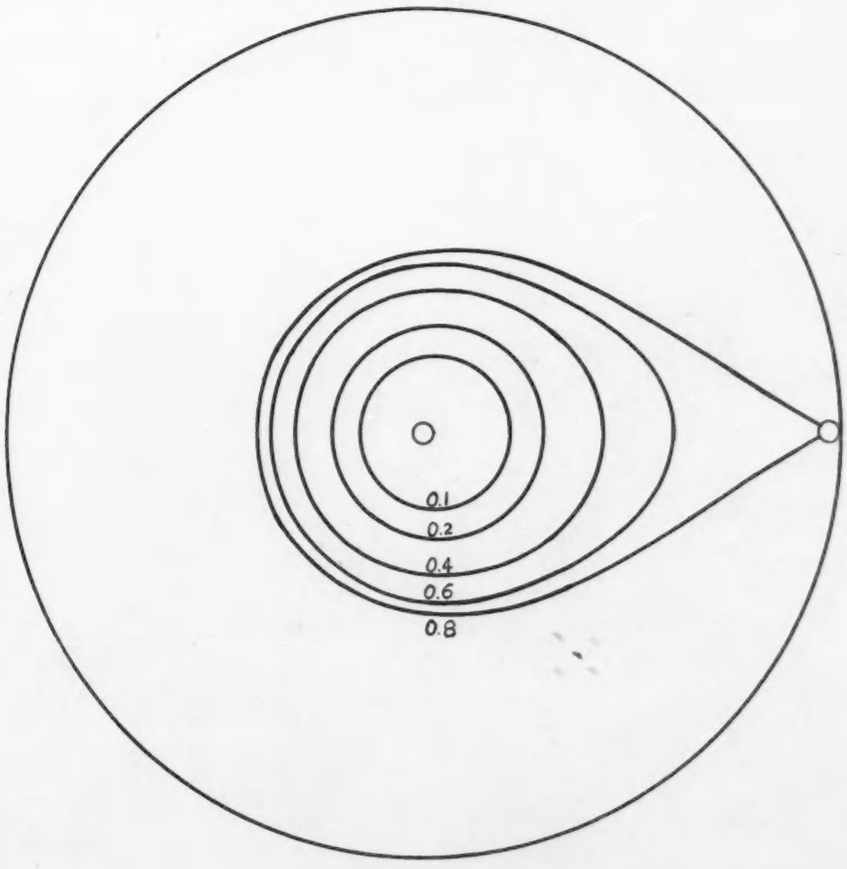


FIGURE 3

Input well at center, producing well at perifera of circle.

7 RECYCLING
have chosen

WORLD'S LARGEST RECYCLING PLANT in operation. Corpus Christi Corporation, Stratton Field, Texas. Now equipped with 5 600-H.P. CLARK "Angles."

5 800-H.P. "ANGLES" — TOTAL 4000 H.P. in what will be world's largest recycling plant, Coastal Recycling Company, Agua Dulce Field, Texas.

PLANTS . . .
CLARK "ANGLES"

Largest Plant in Operation— 3000 H.P.—CLARK Equipped

Largest PROJECT—4000 H.P.— Also Will Be CLARK Equipped

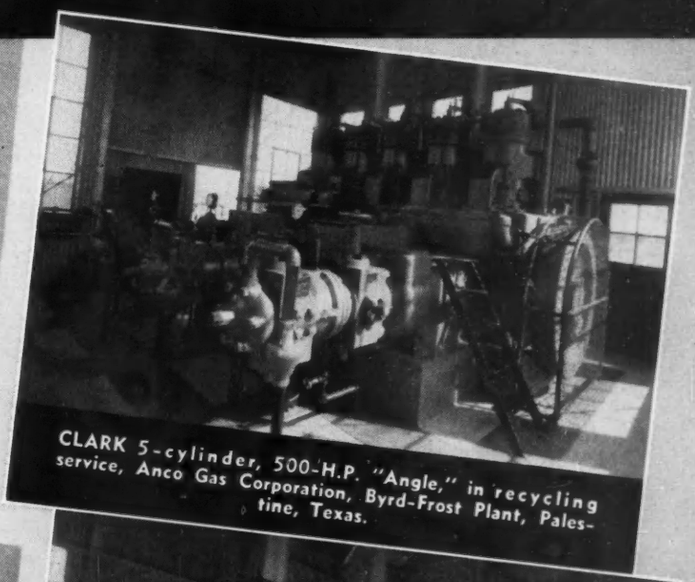
The process of distillate extraction and recycling of high-pressure gas has been one of the major developments in the oil industry, in the past 2 years. Of the distillate plants that have been constructed and placed in operation, in this period, 7 have selected CLARK "Angles" as compressor equipment.

The largest such plant at present in operation (see opposite page), has just installed its fifth CLARK 6-cylinder, 600 H.P. "Angle," and now totals 3000 H.P. of CLARK "Angles."

And the largest projected plant in this field, which will have a capacity of 140,000,000 cu. ft. of gas (see opposite page), will be equipped with five 8-cylinder, 800 H.P. CLARK "Angles," totalling 4000 H.P.

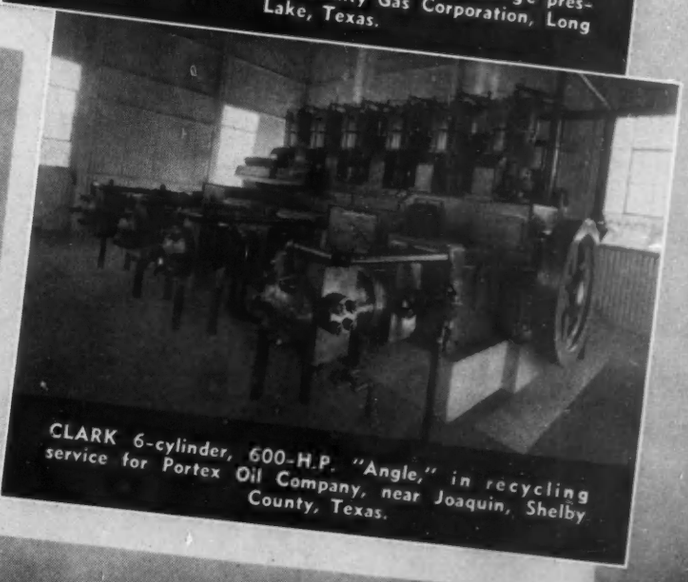
This is just a small part of the success story of the CLARK "Angle," in its first three years on the market. In this period a new compressor sales record has been achieved, of over 100,000 H.P. sold. This success has been attributable to unsurpassed mechanical efficiency, proven reliability, and to these 4 important savings, introduced by this machine: (1) Reduced Transportation and Erection Costs, due to shipment assembled; (2) Smaller Foundation, Floor Space, Building, due to compact design; (3) One-third Fuel Saving, due to CLARK Super-2-Cycle Fuel Injection; (4) Lowest Maintenance, due to simplicity of design and few parts.

Investigate fully. Our nearest office is at your service.



CLARK 5-cylinder, 500-H.P. "Angle," in recycling service, Anco Gas Corporation, Byrd-Frost Plant, Palestine, Texas.

CLARK 600-H.P. "Angle," 4000 lbs. discharge pressure, in recycling service, Trinity Gas Corporation, Long Lake, Texas.



CLARK 6-cylinder, 600-H.P. "Angle," in recycling service for Portex Oil Company, near Joaquin, Shelby County, Texas.

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Export Office: 30 Rockefeller Plaza, New York. Domestic Sales Offices and Warehouses: Tulsa, Okla.; Houston, Texas; Chicago, Ill.; Boston, Mass. (131 Clarendon St.) West Coast Office: Smith-Booth-Usher Co., Los Angeles, Cal. Foreign Offices: 72 Turnmill St., E. C. 1, London; 4 Str. Gen. Poetas, Bucharest, Roumania.

CLARK

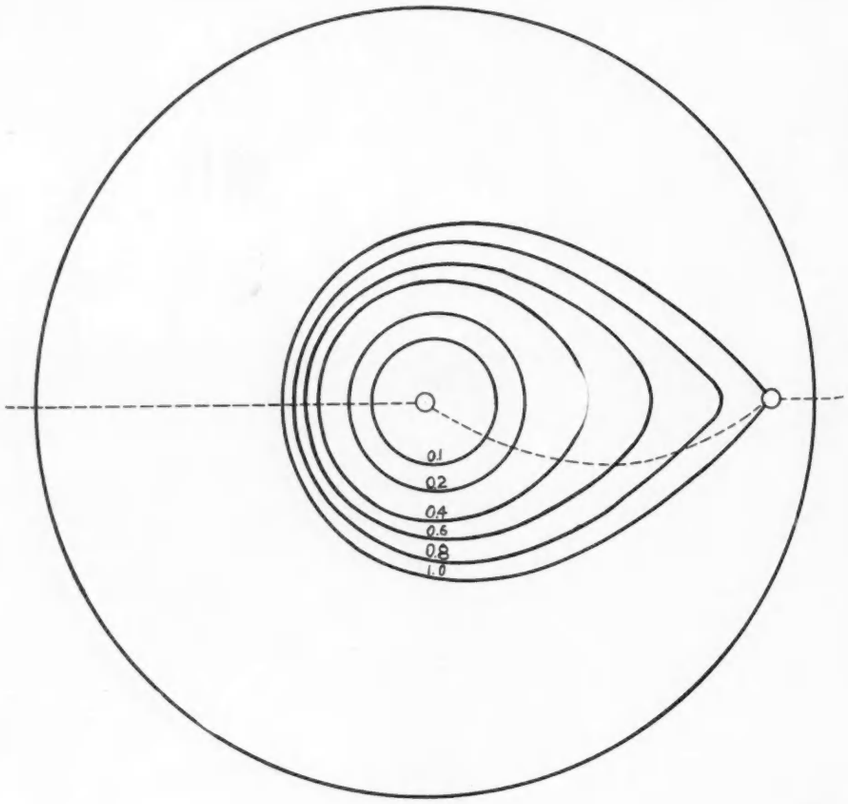


FIGURE 4
Input well at center, producing well one-eighth of well spacing from perifera of circle.

meability is enormous as in cavernous formations.

(2) Application of Fundamental Figures to Other Shapes

The actual problem consists of analyzing an irregularly shaped closure with wells placed at various points. The figures presented in this paper, were chosen for their adaptability to this purpose.

For unusually difficult shapes, or for visually studying various operational procedures, an agar film the same shape that the field is assumed to be may be "recycled" in the laboratory.

Figures 2, 3, 4, 5, 6 and 7 are copies of actual patterns. The numbers in the diagrams refer to total areas of the successive diagrams as ratios to the area of a square whose side is the distance between the two wells.

Imagine for the moment that a partition existed in the system such as the dotted line in Figure 4. If that partition coincides exactly with a current line, it would not be intercepting any flow of current and would not therefore change the pattern in the least. The pattern on either side of the partition line could be produced independently of the other. The rule may be stated thus: A dividing line may be drawn through the figure anywhere as long as it does not intercept a path taken by the current, i.e., as long as it follows the current lines. The dotted lines in Figure 4 and Figure 5 both satisfy this requirement. The arc of any circle passing through both wells in Figure 5 fulfills this requirement. The line across Figure 7 is a limiting case. It divides the patterns produced by two separate output wells. Such lines can be described for multiple producing or injection wells without the wells being symmetrically located. A pair of wells on the border of a straight-boundary field would give a pattern identical with half of Figure 5 and the appropriate constants in the table divided by 2 would apply. If the wells are a short distance from the boundary, perhaps half of Figure 6 and half of Figure 5 would apply with only a negligible error. Interpolation between constants for two figures may be made. If an irregular division of a figure is made as in Figure 4 the area would have to be measured to arrive at the constant.

(3) Cases Modified by Previous Recycling Operations

As an illustration consider a circular field with an injection well in the center and a producing well on the edge with the dry gas having reached the producing well. Figure 3 defines the shape and position of the dry gas area. Now assume that a producing well is drilled on the edge of the field opposite the first producing well and is to be operated in conjunction with the old injection well. The application of Figure 3 to the same injection well and the new producing well will indicate the results to be obtained with those two as a unit. The dry gas from the first operation extends some distance toward the new producing well. The gas velocity is greatest directly between the two wells and least on the opposite sides of them. Consequently the extent of the dry gas in

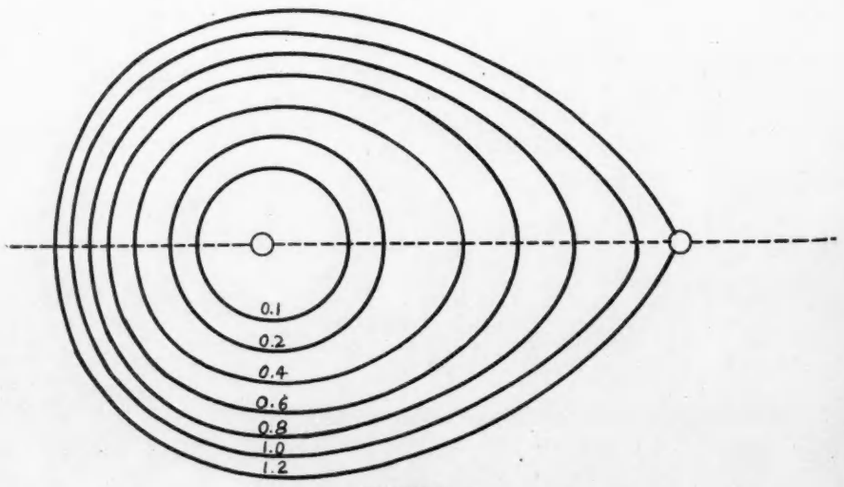
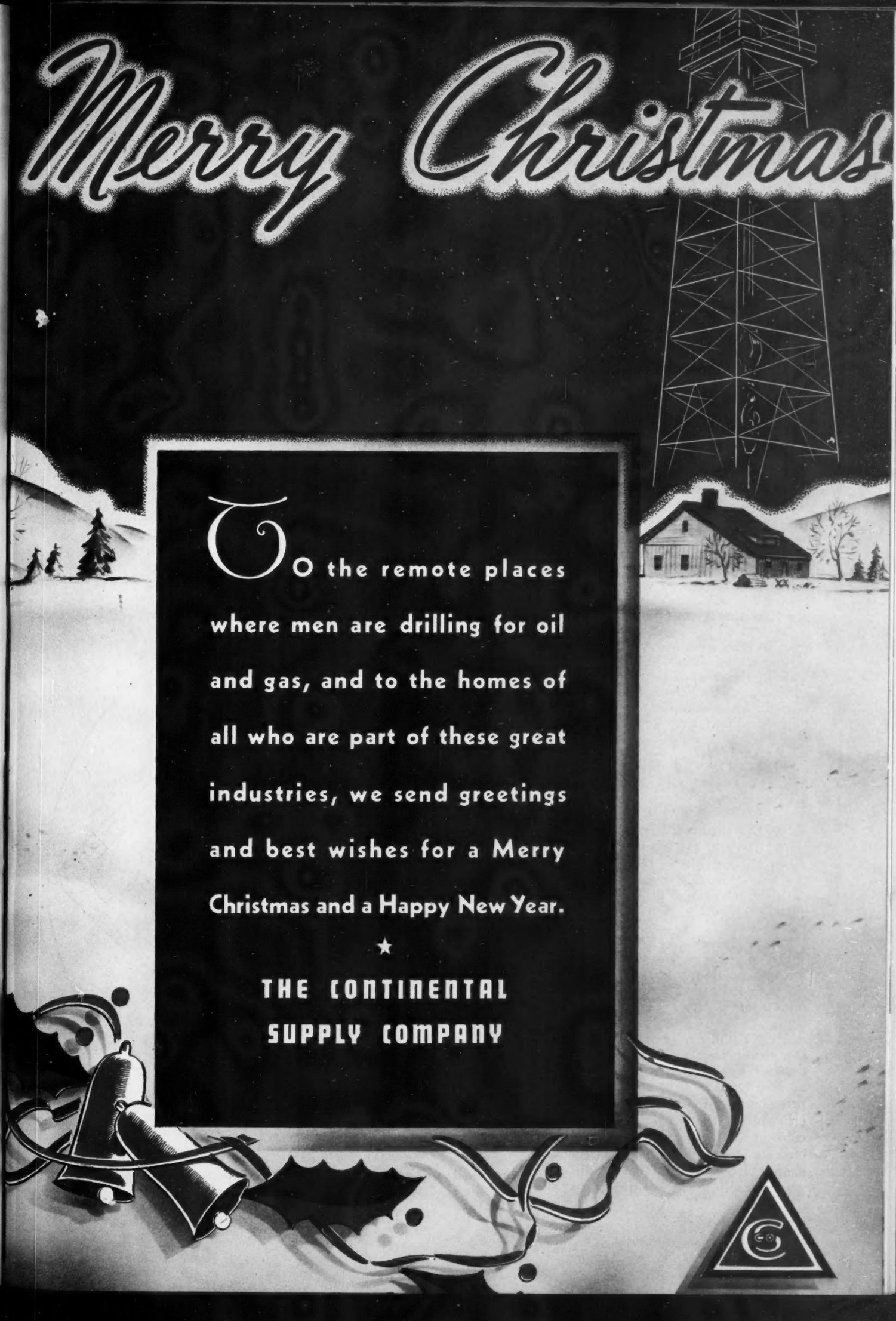


FIGURE 5
Both input and producing wells far from boundaries


Merry Christmas
To the remote places where men are drilling for oil and gas, and to the homes of all who are part of these great industries, we send greetings and best wishes for a Merry Christmas and a Happy New Year.
THE CONTINENTAL SUPPLY COMPANY

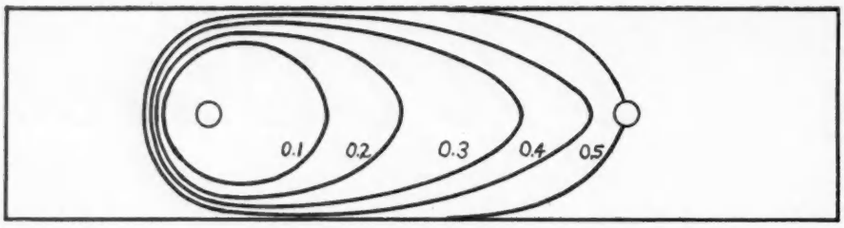


FIGURE 6
Both input and producing wells in center of a long strip half as wide as the well spacing.

the direction of the new well will affect the amount of recycling possible before the dry gas reaches it. Suppose, for example, that as a result of the operation with the first producing well the dry gas extends in the direction of the new well to the 0.4 line of Figure 3 applied to the new well. This means that 0.4 must be subtracted from the constants when Figure 3 is applied to the injection well and the new producing well.

If the two producing wells had been operated simultaneously, about 4 percent more area would have been displaced. This may be shown analytically or by applying Figure 3 to the wells shown in Figure 7, assuming the two producing wells first to be operated one at a time instead of simultaneously. It is something like the two men walking the same distance at different rates. One walks five miles per hour half the distance, then three miles per hour the other half and requires more time than the other who walks a constant four miles per hour. The cases are not analogous but may be equally surprising.

Discussion of Results

The data in the table are read directly from plots of the slopes of the curves relating area increases with time. The slope of such a curve is directly proportional to the richness of the gas.

The figures are averages of duplicate experiments. In general they are interpolated between those in the actual data in order to be even increments of area.

Similar figures derived mathematically differ only slightly from these experimentally determined figures. The former are somewhat more pointed as they approach the producing well. There was a feathering out of the border of the blue color at the points which had traveled farthest. This phenomenon should also exist in actual gas displacement. The pattern was traced along what was considered an average and is thought to more nearly approximate actual conditions.

There is at least one check on the method. It is understood that the Keeling well in the Long Lake field dried up approximately nine months after a nearby recycling plant was put into operation. The application of the above described method checks the result.

It is to be observed from the table that the constants in the first column for Figures 2 and 3 are the same, but from the second and third columns it is seen that the producing well in Figure 3 dries up somewhat more rapidly. The chief difference is in the shape and position of the dry gas area. Evidently a pool can be more completely covered by patterns similar to Figure 2 which means that the edges of a pool are more desirable locations for injection wells. Figures 4 or 7 may have been operated in the reverse direction getting patterns and data bearing the same relation to them as Figure 2 bears to Figure 3. The data and results are so evident that space is not taken to present them.

It is seen that injection wells near the property line are objectionable as 30 or 40 percent of the dry gas may go under the adjoining lease.

Scattered areas of dry gas such as Figures 4 or 5 make a difficult problem for subsequent programs for further recycling.

The principles given here should influence the selection of well locations and the plan for future operation in an important way if maximum recovery of liquid is to be realized.

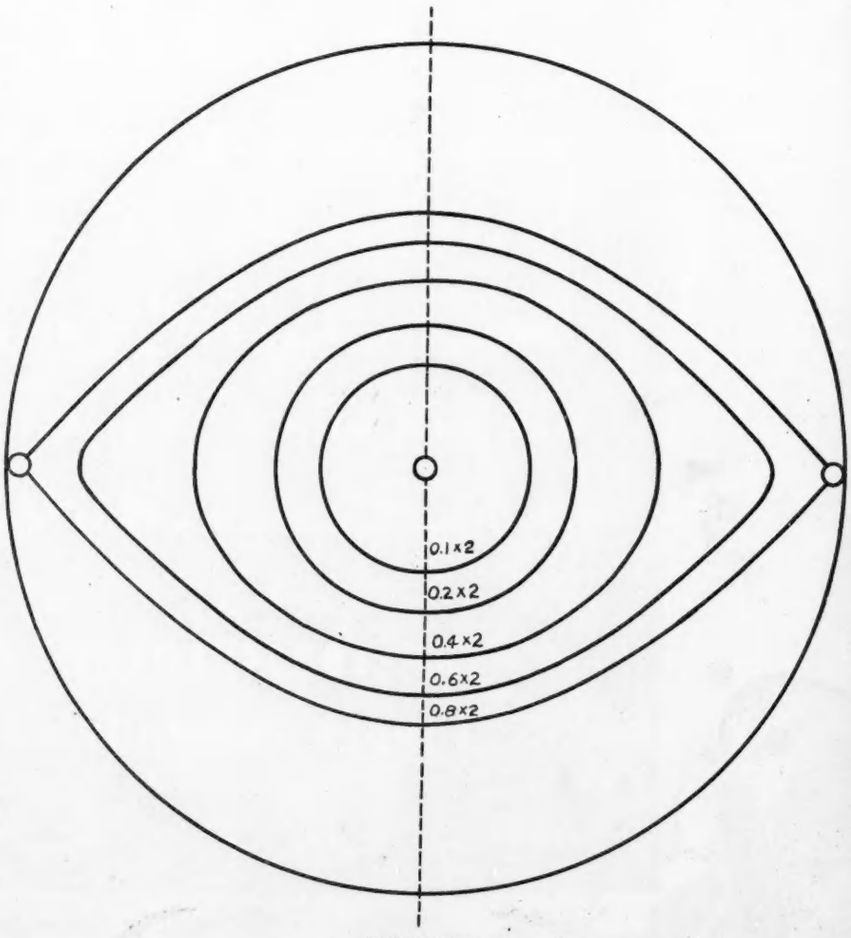
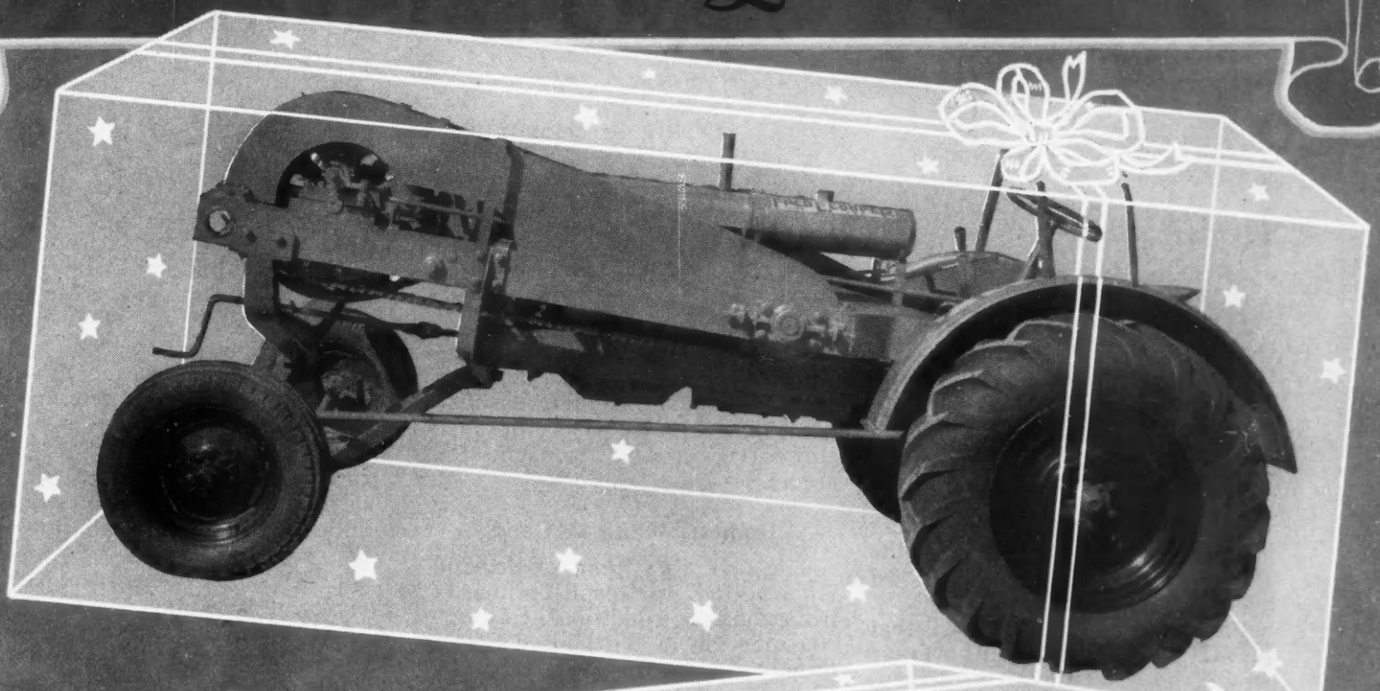
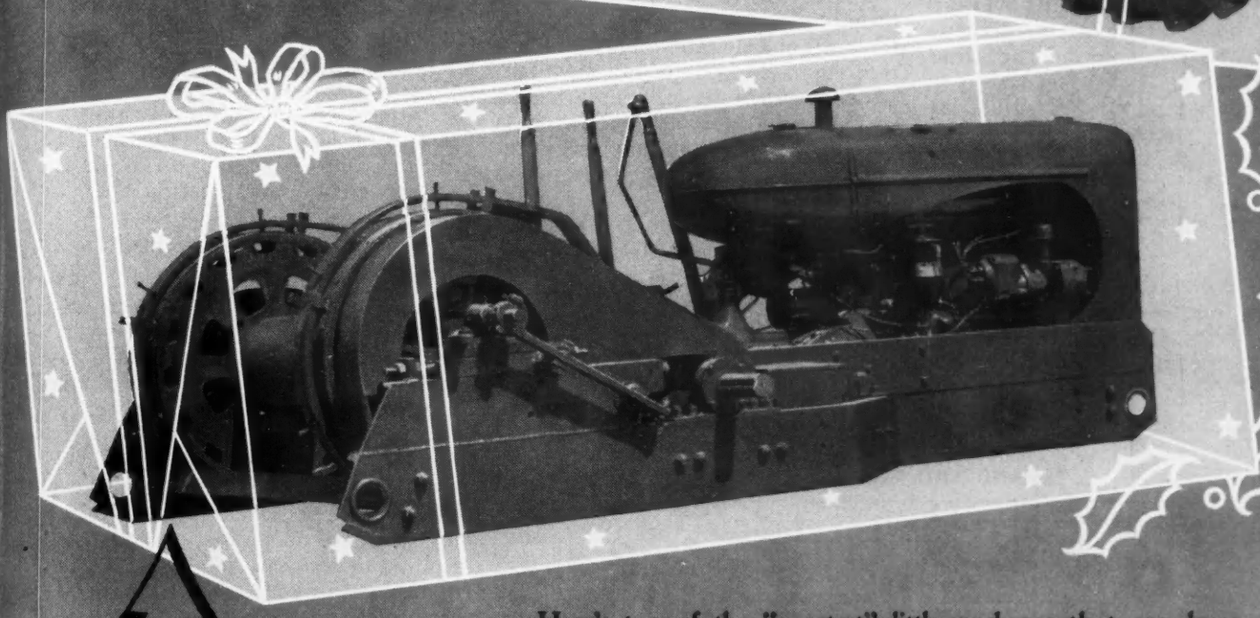


FIGURE 7
Input well at center, two output wells diametrically opposite each other at perifera of circle.

Christmas Greetings to Producers





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Advantage: Good Demand for Oil

Handicap: Surplus Gasoline

By L. J. LOGAN, Associate Editor

INASMUCH as economists are expecting a further expansion of 5 to 10 percent in general industrial and business activity in 1940, the outlook for the oil business in the new year is promising, despite various difficulties within the industry.

Industrial production fluctuated rather widely in 1939 but was comparatively high, the Federal Reserve Board index of output having been at about 105 percent of the 1923-1925 average. The index had averaged 105 also in 1936.

For 1940 it is anticipated that the F. R. B. index will average around 110, or about 5 percent higher than in 1939, and the same as in 1937.

From the standpoint of industrial production, therefore, 1940 is expected to be busier than 1936, equally as busy as 1937, and nearly as busy as the banner year 1929, when the F. R. B. index averaged 119.

With industrial activity greater in 1940, the petroleum industry may confidently expect further gains in volumes of business; for the industry still is growing, and it regularly shows continued expansion except in particularly adverse years.

In 1939 the industry has encountered new all-time record demands for its products, including gasoline and the fuel oils. And for 1940 still better records in consumption are in prospect.

Domestic Outlook Good

The favorable trend of demand is expected to result primarily from domestic conditions. Gasoline consumption in the United States promises to be relatively large, as the automobile manufacturers anticipate making and selling 10 to 15 percent more cars and trucks in 1940 than in 1939. Aside from a net gain in automobile registrations, there may be expected a continuation of the usual increase in annual consumption of gasoline per vehicle. Thus a substantial gain in gasoline demand is indicated.

Similarly, fuel oil consumption, after having exceeded all previous records in 1939, probably will show further expansion in 1940. The indicated brisk industrial activity will assure a continuation of strong demand for residual fuel oils and lubricants. And the expected favorable general business conditions may be counted upon to promote further large demand for heating oils; for the use of installed oil burners will be encouraged, while construction of new homes and buildings will assure installation of numerous new burners.

Similarly, the expected comparatively good conditions for the agricultural population likely will encourage use of kerosene as well as gasoline on farms, and demand for kerosene may be expected to be relatively large.

Asphalt consumption also promises to be large, in consequence of the indicated continuation of brisk activity in the construction field.

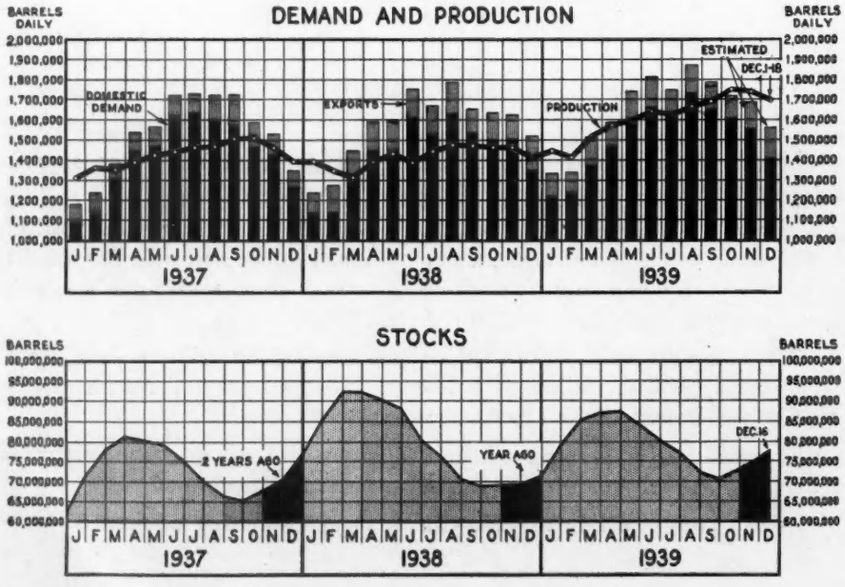
Export Picture Clouded

Export business is more difficult to predict, in view of the uncertainties involved in the European war. But current expectations are conservative. Exports since outbreak of the war in western Europe have been disappointing, and early optimistic estimates of war-induced business have been tempered. The belligerents so far have been buying as little as possible of oils as well as other materials, apparently in the desire to conserve financial resources; and the mild nature of the war has held down the urgency of demand for oils. Moreover, the war has seriously interfered with shipping, and movement to neutral countries as well as to belligerents has been hampered.

Currently, the large exporters of oil foresee little, if any, more foreign demand in 1940 than in 1939. In fact, some companies expect to sell less oil abroad in the coming year than in the past year.

Figures lately released by the Bureau of Foreign and Domestic Commerce showed that oil exports in November were smaller than in

GASOLINE SITUATION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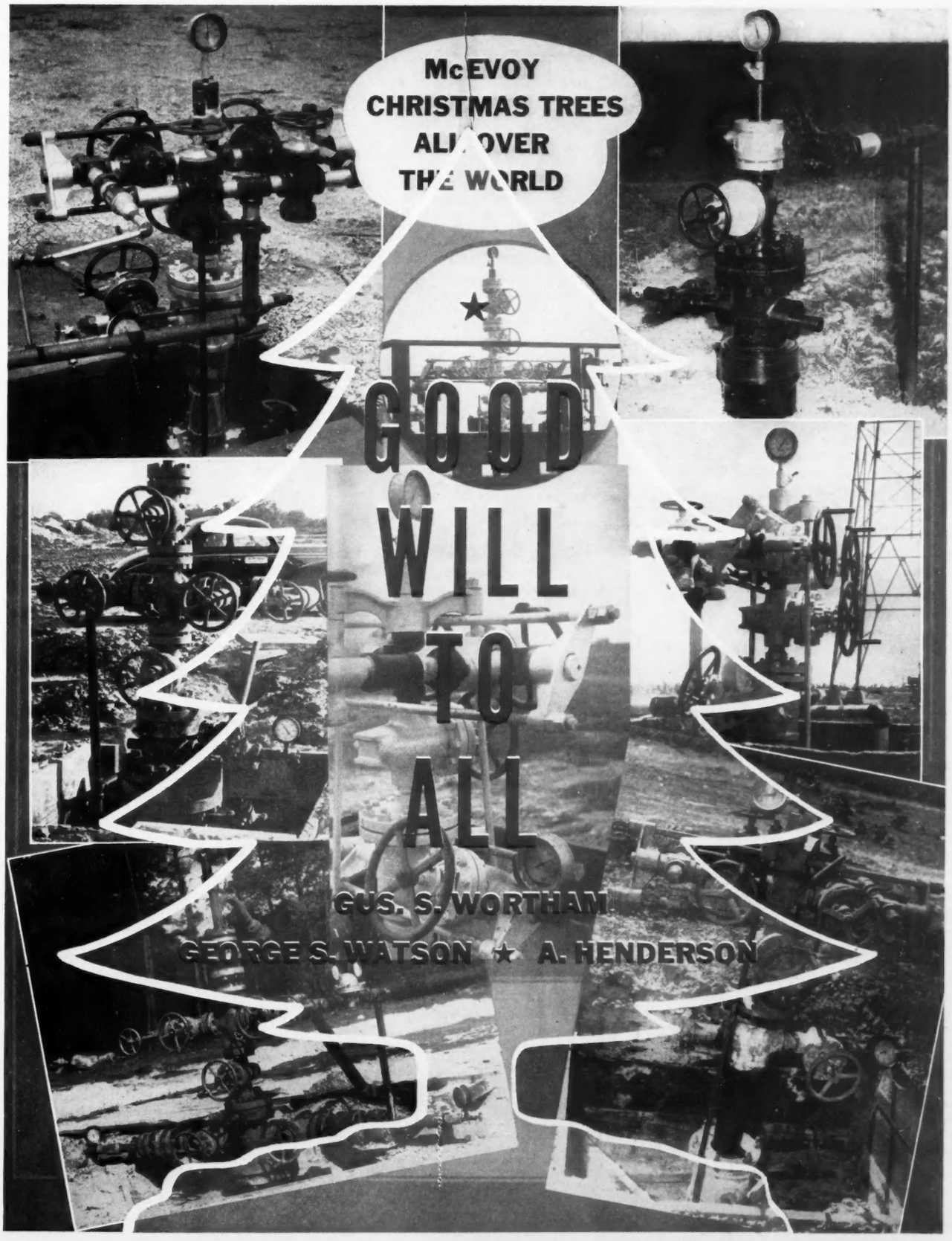

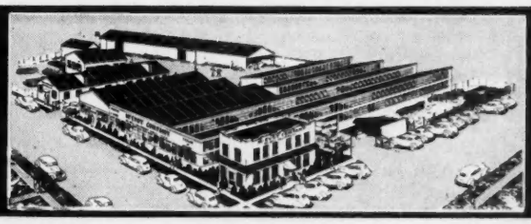

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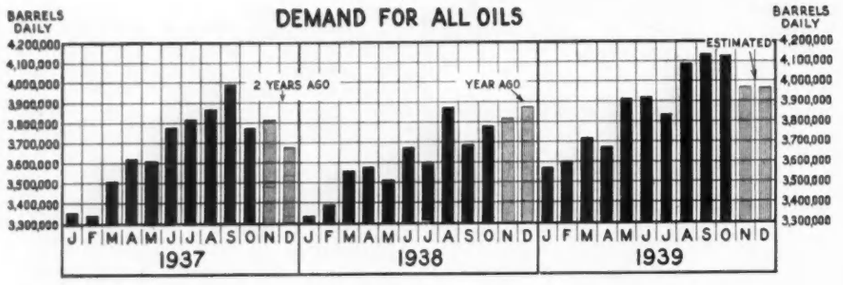
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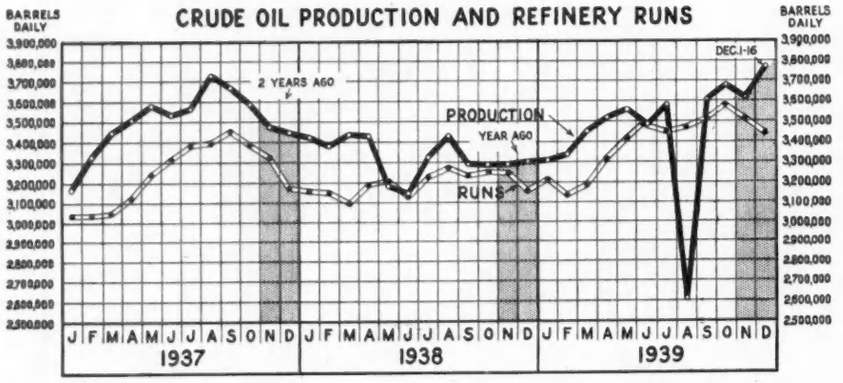
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October, although somewhat larger than in November of last year. The exports of petroleum and petroleum products for November, 1939, were valued at $31,261,000, compared with $36,018,000 in October, $29,011,000 in November of last year, and $35,104,000 in November of 1937. Crude oil exports in November were valued at $6,623,000, compared with $9,011,000 in October, $7,635,000 in November, 1938, and $9,842,000 in November, 1937.

Gasoline Situation Disturbing

While the general business outlook and the oil demand prospects for 1940 are good, some conditions within the oil industry itself cast shadows over the oil outlook.

Particularly disturbing is the gasoline situation, stocks being excessive even in relation to prevailing large consumption, and prospects for betterment of the inventory position during the coming year being poor.

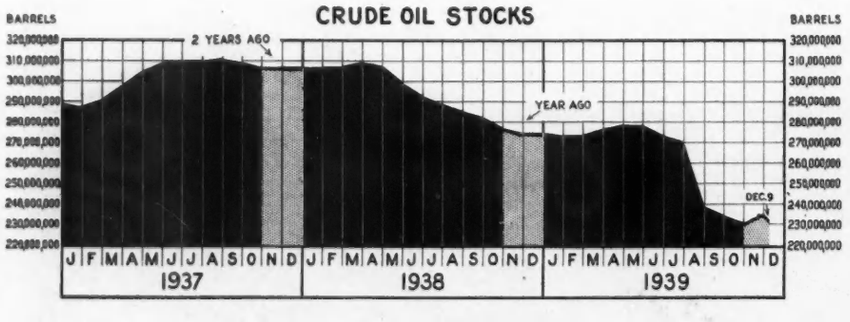
In the face of warnings offered repeatedly in the industry's statistics, gasoline stocks have been permitted to grow increasingly burdensome, until finally they have appreciably depressed prices.

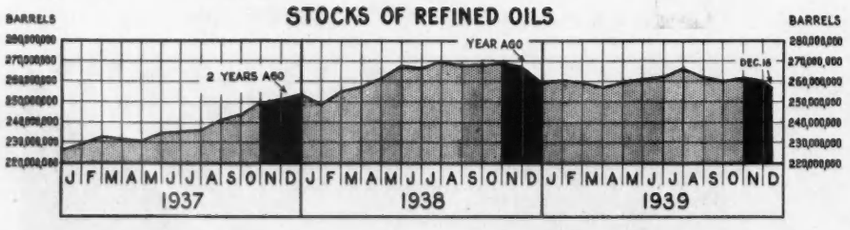
The gasoline inventory is generally regarded as 10,000,000 to 15,000,000 barrels larger than necessary, and any material cutting down of the surplus seems unlikely during the winter, indicating that the industry may enter the spring-summer season of larger consumption with stocks at the highest level in history and with markets seriously handicapped by the large inventory.

In the week ended December 16 the gasoline storage was further increased 962,000 barrels, to the level of 78,158,000 barrels. That quantity was 10.7 percent greater than the excessive supply held at the corresponding time last year, although demand has been running only around 5 percent larger in 1939 than in 1938. Thus gasoline stocks are relatively more excessive now than they were a year ago.

In its forecast for January, the Bureau of Mines has anticipated that total demand for gasoline during the month will be 4.6 percent greater than in January a year ago. Domestic consumption was estimated 4.6 percent larger and exports 4.5 percent higher.

For December the bureau had





Changes from Year Ago in Stocks of Crude and Refined Oils in the United States

(Barrels of 42 U. S. Gallons)

LATEST WEEKLY DATA

(Sources: Crude Stocks, Bureau of Mines; all other figures, American Petroleum Institute.)

STOCKS OF:	Dec. 17, 1938	Dec. 16, 1939	Percent Change
Gasoline	[1]70,573,000	78,158,000	+10.7
[1]Gas Oil & Distillate Fuels	30,039,000	29,012,000	— 3.4
[1]Residual Fuel Oil	116,340,000	103,151,000	—11.4
Crude Oil	[2]269,509,000	[3]232,016,000	—13.9

LATEST MONTHLY DATA

(Source: Bureau of Mines)

ITEM	Stocks at End of October 1938	Stocks at End of October 1939	Percent Change
Summary—			
Crude Petroleum:			
Refinable in U. S.	277,422,000	230,854,000	—16.9
Heavy in Calif.	17,143,000	14,070,000	—17.9
Natural Gasoline	6,771,000	5,140,000	—24.1
Refined Products	269,336,000	261,548,000	— 2.9
Total, all oils	570,672,000	511,612,000	—10.4
Days' supply:			
October basis	151	124	—17.9
10 Mo. basis	158	133	—15.8
Products—			
Gasoline:			
Finished	63,542,000	68,116,000	+ 7.2
Unfinished	5,735,000	5,203,000	— 9.3
Total	69,277,000	73,319,000	+ 5.8
Kerosene	9,949,000	9,967,000	+ 0.2
[4]Gas Oil & Distillate Fuels	33,017,000	30,951,000	— 9.3
[4]Residual Fuel Oils	103,423,000	94,757,000	— 8.4
Lubricants	7,718,000	6,639,000	—14.0
Wax (thousands of pounds)	128,926,000	81,147,000	—37.1
Coke (short tons)	653,800,000	652,000,000	— 0.2
Asphalt (short tons)	446,300,000	472,000,000	+ 5.8
Road Oil	686,000	715,000	+ 4.2
Miscellaneous	265,000	289,000	+ 9.1
Other Unfinished Oils	38,816,000	38,765,000	— 0.1

[1] At refineries only, except in California.
[2] Stocks, December 10, 1938.
[3] Stocks December 9, 1939.
[4] At refineries only.

estimated total gasoline demand up 2.4 percent, as compared with a year previously, with domestic requirements 4.7 percent larger but exports 15.2 percent lower.

The November estimate had indicated 3.9 percent larger total demand, with domestic use 3.8 percent greater and exports up 5.5 percent.

Figures of the Bureau of Mines on actual consumption are available through October. They show that the total demand for gasoline was 4.4 percent greater in October, 1939, than in October, 1938, as a 7.1 percent gain in domestic consumption outweighed a 23.9 percent decrease in exports.

For the first 10 months of 1939, total gasoline demand was 4.8 percent greater than in the corresponding months of 1938, with domestic use up 5.7 percent and exports down 7.8 percent.

Little Change in Trend of Gasoline Demand Indicated by Bureau of Mines Forecast for January

(Barrels)

MONTH	Total Demand for Domestic Crude	MOTOR FUEL DEMAND		
		Domestic	Export	Total
November:				
November, 1939, forecast	108,600,000	46,700,000	3,900,000	50,600,000
November, 1938, actual	102,717,000	44,991,000	3,698,000	48,689,000
Change from year ago	+5.7%	+3.8%	+5.5%	+3.9%
December:				
December, 1939, forecast	112,210,000	43,600,000	4,600,000	48,200,000
December, 1938, actual	102,271,000	41,649,000	5,423,000	47,072,000
Change from year ago	+9.7%	+4.7%	—15.2%	+2.4%
January:				
January, 1940, forecast	110,660,000	39,500,000	3,800,000	43,300,000
January, 1939, actual	103,745,000	37,767,000	3,638,000	41,405,000
Change from year ago	+6.7%	+4.6%	+4.5%	+4.6%

Heating Oil Situation

Stocks of heating oils have continued light in relation to the current large demand. On December 16 the stocks were 3.4 percent smaller than a year previously.

Demand for heating oil has been higher this year than last year, as more oil burners have been put into use. In October, 1939, total demand for gas oil and distillate fuel was 19.9 percent greater than in October, 1938; domestic use was 11.3 percent larger, and exports totaled 2,756,000 barrels against 1,574,000 in October, 1938.

In the first 10 months of 1939, the total demand for gas oil and distillate fuel was 13.9 percent greater than in the similar period of 1938. Domestic consumption was 14.5 percent larger, and exports were up 12.8 percent.

Industrial Fuel Oils

Considering the current and prospective high rates of industrial activity, inventories of heavy fuel oils are comparatively small. On December 16 the stocks of residual fuel oil were 11.4 percent lower than one year previously.

In contrast, demand for heavy oil has been greater this year than last year. In October the total demand for residual fuel oil was 9.2 percent larger than in October, 1938. Domestic consumption was up 11.1 percent, although exports were down from 1,643,000 to 1,296,000 barrels.

Demand for residual fuel oil in the first 10 months of 1939 was 10.8 percent greater than in the similar period of 1938. Domestic requirements were up 11.1 percent and exports 9/10 of 1 percent.

The statistics for October reflected the great increase lately in demand for lubricants.

Gains in demand for wax have been nearly as great as those for lubricants.

Demand for Oil Better This Year Than Last Year

Figures indicate barrels and are from Bureau of Mines

ITEM	OCTOBER			FIRST 10 MONTHS		
	1938	1939	Percent Change	1938	1939	Percent Change
SUMMARY						
Total Demand	117,261,000	128,057,000	+ 9.2	1,096,051,000	1,173,202,000	+ 7.0
Daily average	3,783,000	4,131,000	+ 9.2	3,605,000	3,859,000	+ 7.0
Exports:						
Crude petroleum	6,780,000	6,947,000	+ 2.4	66,769,000	62,094,000	— 7.5
Refined products	9,388,000	9,805,000	+ 4.4	96,779,000	100,536,000	+ 4.1
Domestic Demand:						
Motor Fuel	46,365,000	49,687,000	+ 7.1	436,177,000	461,588,000	+ 5.7
Kerosene	5,185,000	5,019,000	— 3.2	44,179,000	47,865,000	+ 8.3
Gas oil and distillate fuels	10,206,000	11,365,000	+ 11.3	90,204,000	103,222,000	+ 14.4
Residual fuel oils	25,624,000	28,475,000	+ 11.1	234,555,000	260,987,000	+ 11.1
Lubricants	1,805,000	2,656,000	+ 47.1	17,664,000	19,861,000	+ 11.1
Wax	72,000	144,000	+100.0	863,000	863,000	....
Coke	442,000	793,000	+ 79.4	4,563,000	5,864,000	+ 28.5
Asphalt	2,620,000	2,986,000	+ 14.0	21,315,000	23,443,000	+ 9.9
Road oil	695,000	577,000	— 16.9	7,478,000	7,563,000	+ 1.1
Still gas	5,646,000	5,970,000	+ 5.8	55,294,000	55,462,000	+ 0.3
Miscellaneous	149,000	173,000	+ 16.1	1,487,000	1,850,000	+ 24.5
Losses	2,284,000	3,460,000	+ 51.5	18,724,000	22,004,000	+ 17.4
Total domestic demand	101,093,000	111,305,000	+ 10.1	932,503,000	1,010,572,000	+ 8.3
Daily average	3,261,000	3,590,000	+ 10.1	3,067,000	3,324,000	+ 8.3
TOTAL DEMAND FOR PRODUCTS						
Motor Fuel:						
Domestic	46,365,000	49,687,000	+ 7.1	436,177,000	461,588,000	+ 5.7
Exports	4,526,000	3,443,000	— 23.9	40,988,000	38,863,000	— 7.8
Total	50,891,000	53,130,000	+ 4.4	477,165,000	500,451,000	+ 4.8
Kerosene:						
Domestic	5,185,000	5,019,000	— 3.2	44,179,000	47,865,000	+ 8.1
Exports	683,000	1,107,000	+ 62.0	6,377,000	7,024,000	+ 10.2
Total	5,868,000	6,126,000	+ 4.4	50,556,000	54,889,000	+ 8.5
Gas Oil and Distillate Fuels:						
Domestic	10,206,000	11,365,000	+ 11.3	90,204,000	103,222,000	+ 14.5
Exports	1,574,000	2,756,000	+ 75.0	24,958,000	27,907,000	+ 12.8
Total	11,780,000	14,121,000	+ 19.9	115,162,000	131,129,000	+ 13.9
Residual Fuel Oils:						
Domestic	25,624,000	28,475,000	+ 11.1	234,555,000	260,987,000	+ 11.1
Exports	1,643,000	1,296,000	— 21.1	14,913,000	15,054,000	+ 0.9
Total	27,267,000	29,771,000	+ 9.2	249,468,000	276,041,000	+ 10.8
Lubricants:						
Domestic	1,805,000	2,656,000	+ 47.1	17,664,000	19,861,000	+ 12.5
Exports	715,000	985,000	+ 37.7	8,042,000	9,481,000	+ 18.4
Total	2,520,000	3,641,000	+ 44.4	25,706,000	29,342,000	+ 14.1
Wax (thousands of pounds):						
Domestic	20,163,000	40,567,000	+101.1	241,604,000	241,640,000	+ 0.1
Exports	23,529,000	19,210,000	— 18.3	164,069,000	205,689,000	+ 25.0
Total	43,692,000	59,777,000	+ 36.8	405,673,000	447,329,000	+ 10.3
Coke (short tons):						
Domestic	88,300,000	158,500,000	+ 97.9	912,600,000	1,172,800,000	+ 28.3
Exports	27,300,000	22,700,000	— 16.8	119,800,000	234,700,000	+ 96.5
Total	115,600,000	181,200,000	+ 56.7	1,032,400,000	1,407,500,000	+ 36.3
Asphalt (short tons):						
Domestic	476,400,000	543,000,000	+ 14.1	3,875,500,000	4,262,300,000	+ 10.0
Exports	4,400,000	3,500,000	— 20.4	41,100,000	38,000,000	— 7.3
Total	480,800,000	546,500,000	+ 13.6	3,916,600,000	4,300,300,000	+ 9.7
Road Oil:						
Domestic	695,000	577,000	— 16.9	7,478,000	7,563,000	+ 1.1
Miscellaneous:						
Domestic	149,000	173,000	+ 16.1	1,487,000	1,850,000	+ 24.4
Exports	3,000	17,000	+466.6	91,000	91,000	....
Total	152,000	190,000	+ 25.0	1,578,000	1,941,000	+ 23.0

New East Texas Proration Plans

[*Continued from page 14*]

age per well × well factor × field factor + 20 = well allowable.

Subsea Top of Sand Contour	Well Factor	Subsea Top of Sand Contour	Well Factor
3320	100	3185	23
to		3180	20
3235	100	3175	16
3230	98	3170	13
3225	93	3165	11
3220	87	3160	9
3215	75	3155	8
3210	64	3150	6
3205	54	3145	5
3200	42	3140	4
3195	32	3135	2
3190	26		

Proration formula using well factor percent:
Acreage Per Well × Well Factor × Field Factor = Proratable Oil

Examples of Application:
Assumed Field Factor 0.0187
Well on 3290 contour with 4.86 acre density:
4.86 × 100 × 0.0187 = 9.09 bbls.
Well on 3190 contour with 3.25 acre density:
3.25 × 26 × 0.0187 = 1.58 bbls.
Well on 3205 contour with 7.10 acre density:
7.10 × 54 × 0.0187 = 7.17 bbls.

There were two primary difficulties in applying the formula: first, the fact that the field must be zoned on the basis of sand tops, and second, the higher withdrawals from the west edge, in the opinion of several engineers, would result in releasing the pressure on the east side of the field and creating a gas cap. In addition to this, application of the formula with the 20-barrel minimum included resulted in disproportionate withdrawals on offsetting leases. Speller said that the smaller the minimum allowance included, the more fairly the formula would serve to enable each operator to obtain from his lease approximately the amount of oil in place now.

Sinclair Plan

Sinclair Prairie Oil Company presented a plan which contemplated giving between one third and one half the proratable oil to the west side operators under a formula similar to that used by the commission. Proponents of this program declared that inclusion of the 20-barrel minimum did not have the effect of throwing the plan out of balance.

Sinclair engineers also advocated returning salt water to the Woodbine sand as one of the primary requirements to a conservative operation. The Sinclair company suggested a revised formula as follows:

a—Well Density
p—Well Potential
bhp—Well Bottom Hole Pressure
st—Average Sand Thickness
A^w—Total Acres West of the Water Line
BHP^w—Total Bottom Hole Pressure West of Water Line
X—Proratable Oil for Field

Present Formula

$$\frac{[a \times p \times st \times (bhp)]}{\text{Sum of Products for all wells}} \times \text{Plus 20 equals Well Allowable}$$

Proposed Formula

$$\frac{[a \times p \times st \times (bhp)]}{\text{Sum of the Products for all wells}} \times \frac{2X}{3} \text{ Plus}$$

$$\frac{(a \times bhp)}{A^w \; BHP^w} \times \frac{X}{3} \text{ Plus 20 Equals Well Allowable}$$

$$\frac{(a \times bhp)}{A^w \; BHP^w}$$ to be given only to those wells west of the water line

It appeared, as the Sinclair plan was explained, that the result would be proration of about two thirds of the oil on the basis it is allocated now and the remaining third would be added to the allowances made for wells west of the original water line which runs through the heart of the field.

F. V. L. Patten, director of production for the Texas Railroad Commission, presented testimony to show that:

1. If the average rate of production remains at 432,000 barrels, and no water is produced, or water is returned to the reservoir, pressures will continue at about 1100 pounds by June, 1943.

2. If the rate is 432,000 barrels and water continues at the rate at which it has been increasing, pressures will drop to 740 pounds in June, 1943.

3. If the production is 380,000 and no water is returned, pressures will drop to 740 pounds early in 1944.

This, he said, proved the importance of returning water to the reservoir, and he declared that the injection of the water is more important than the rate of production as long as the rate of flow does not vary radically.

Water-Oil Ratio

Testimony presented by R. O. Garrett, petroleum engineer for Arkansas Fuel Oil Company, supported the arguments for returning water to the reservoir, and he suggested that the commission adopt the use of the oil-water ratio. His plan provided that the commission operate the oil-water ratios in the same manner that gas-oil ratios are used in other fields, and he suggested that an operator be allowed to produce two barrels of water to one barrel of oil. With this added to the present formula, Garrett thought that a fair method of allocation would be devised.

Garrett also advocated a lower minimum allowance, but declined to recommend a figure below 20 barrels as proper. However, he pointed out that shutdown days for the past two years have actually reduced the well production. During recent weeks, the average has been only 12 barrels a day. This would seem to be conclusive proof that East Texas operators will not abandon their wells if production is cut below 20 barrels, as has been argued by some operators in the past.

It also supports the contention advanced by major oil companies that independents would be able to survive with lower daily allowables, which might have some influence on reducing the minimum used by the commission.

Nuisance taxes on oil running behind last year

Federal gasoline tax collections in November totaled $18,425,741, an increase of approximately $1,967,000 over the October receipts of $16,458,880 but $383,000 under the $18,808,894 recorded for November, 1937, it was reported December 20 by the Bureau of Internal Revenue.

Collections from the lubricating oil tax amounted to $2,987,655 for the month, against $2,291,291 in October and $2,469,541 in November of last year, it was announced, and receipts from the pipeline tax were $1,038,951, against $731,207 the preceding month and $1,013,355 in the corresponding month of 1938.

Despite the heavy November collections, only the gasoline tax returned more during the first 11 months of the year than in the same period in 1938, with a total of $198,216,616 against $183,946,979, bureau records showed. Collections from lubricating oils totaled $27,530,441 against $28,385,488 last year, and the revenue from pipeline transportation was $10,220,113, against $10,659,928.

The Texas Company holds safety contest at Drumright

The Texas Company held its annual safety demonstration meeting at Drumright, Oklahoma, December 12. A. L. Kraft, district superintendent of production at Drumright, was master of ceremonies. M. J. Heald, assistant division manager of production, Tulsa, gave a short talk prior to starting the contest. J. W. Whetsell, safety engineer, explained the problems confronting the five six-man teams, after the problem was completed.

Lee Connors, safety engineer, Houston, S. H. Benner, head of personnel department, Tulsa, and Stanley Donley, production superintendent Osage district, also were present at the meeting.

Prizes were awarded each man participating in the events with the winning team receiving a silver cup.

HIGHLIGHTS IN THE WEEK'S NEWS

Allowables

Texas fields to shut in 13 days during January

Texas oil fields will be shut in one additional day during January, 1940, the railroad commission having issued a statewide proration order providing for 13 shutdown days as compared with 12 in December, and 11 in October and November. Thus, the fields in the state will be permitted to produce but 18 days during the month, as compared with 19 during December. During the early part of 1939 production was barred on fewer days per month; for instance, eight days last February.

This continued upward trend in the number of production holidays per month has oil operators wondering if they are to be confronted with larger doses of this method of prorating output. Already the situation has reached an acute point. During 1939 fields in the state were shut down 119 days. This figure, however, includes the 15-day shutdown in August.

In January, Texas wells will be shut in on all Saturdays, all Sundays and all Wednesdays.

The new net allowable of the state of January 1, when the shutdowns are considered, is 1,376,000 barrels daily. This is 34,680 barrels daily less than consumer demand for Texas oil, as estimated by the U. S. Bureau of Mines. However, it is an increase of 76,055 barrels over the allowable on December 1.

The basic allowable is 2,217,496 barrels without the shutdowns.

Field allowables were continued in January as they were at the time the order was issued on December 21. Increases over the December 1 order arises from grants that have been made prior to December 21, and due to allowables assigned to new wells completed during the three-week interval.

The basic allowable in barrels (before reduction for shutdowns) by districts on January 1 follows: Southwest Texas (district 1) 39,506; Southwest Texas (district 2) 92,362; Gulf Coast (district 3) 334,715; Southwest Texas (district 4) 239,048; East Central Texas (district 5) 34,505; East Central Texas (district 6) 93,748; East Texas field (district 6) 690,000; West Central Texas (district 7-B) 41,479; West Central Texas (district 7-C) 28,081; West Texas (district 8) 336,879; North Texas (district 9) 153,193; and Panhandle (district 10) 133,981.

Many Fields Exempted

The following fields were exempted from the shutdowns during January: Cedar Creek North, Chicon Lake, Eckert, Gas Ridge, Luling Branyon, Minerva Rockdale, Salt Falt North, Somerset, Southton, Plummer, Barber's Hill, West Beaumont, Boling, Cedar Point, Damon Mound, Dickinson, Esperson Dome, Eureka Heights, Gillock, Goose Creek, Hamman Deep, High Island, Hitchcock, New Hull, Old Hull, League City, Livingston, Lochridge, Mykawa New, Old Ocean, Schwab, Wilcox, West Columbia, West Columbia New.

Charamousca, Sinton, Taft, Corsicana shallow, Currie, Mexia, Powell, Richland, Wortham, Wortham shallow, Boggy Creek, Grapeland, Lone Star, Rodessa, Redland, Big Lake, McMillan, World, Eaves, Garza, Hendrick, Howard-Glasscock, Iatan-East Howard, Shearer, Snyder, Taylor-Link, Tobarg, and Burns.

Fairer East Texas proration urged

Plans to revise the East Texas proration method so as to give west edge operators a larger share of the field's allowable output were presented at a hearing before the Texas Railroad Commission (see stories pages 12 and 14). Ever since the commission revised its system of proration in the East Texas field, which was the growth of a federal district court ruling last June that held acreage and oil in place had to be considered, numerous operators have been dissatisfied because of the belief the new order was unfair in that it would cause west edge operators to lose much oil they otherwise would have recovered ultimately.

One plan proposed last week would allot every well 20 barrels minimum, after which additional volumes would be granted on the basis of sand depth. The formula would be: acreage per well × well factor × field factor + 20 equals the well allowable. This plan, it was said, would give west edge wells a higher daily allowable. However, several difficulties were foreseen in applying the formula.

Another plan suggested would prorate about two thirds of the field's total allowable on the same basis as present, with the remaining one third to be added to the allocations given west edge wells.

Still another proposal would base the allowable on the oil-water ratio in the same manner as gas-oil ratios are used in other fields. He suggested operators be allowed to produce two barrels of water to one barrel of oil. With this factor added to the present formula, it was stated this would be a fair method of allocation.

News Index

General:

Allowables 45

Men in News 48

Markets-Statistics 49

Pipe Line News 51

World Developments 52

U. S. Field Operations:

Arkansas 60
California 61
Completions 62
East Texas 57
Forest City Basin 54
Illinois 53
Indiana 53
Kansas 54
Kentucky 54
Louisiana Coast 59
Michigan 61
Mississippi 60
North Louisiana 59
North Texas 55
Oklahoma 54
Panhandle Texas 57
Rocky Mountains 61
Southwest Texas 57
Texas Gulf Coast 58
West Texas 56
Wildcat Development 67
Wyoming 61

Bureau estimates January demand 3,569,700 barrels

Market demand for petroleum products during January will require a daily average supply of domestic crude oil of 3,569,700 barrels, it was forecast by the Bureau of Mines December 19.

The January estimate, while 50,000 barrels under the forecast for December (1 percent), is 299,100 barrels above the estimate for January, 1939, and 263,700 barrels (7 percent) above actual output in that month.

In terms of barrels for the month, the bureau stated, 110,660,000 barrels will be required.

Latest figures available to the bureau indicate that daily average crude production during the four weeks from November 4 to December 2 was 3,624,000 barrels and runs to stills 3,510,000 barrels, while crude stocks increased 2,713,000 barrels and, after deduction of 789,000 barrels of foreign oil, showed a net increase in domestic stocks of 1,924,000 barrels, or 69,000 barrels daily. Accordingly, deduction of the stock increase from the production indicates an apparent demand for domestic crude during the period of 3,555,000 barrels daily, compared with 3,620,000 barrels estimated by the bureau.

"Market trends and estimates indicate a probable increase of about 5 percent in total motor fuel demand and at least a 10 percent gain in distillate fuel-oil demand for the first quarter of 1940, compared with the same period in 1939," the bureau stated.

Gasoline Stocks at Peak

"In recent months large runs to stills at relatively high gasoline yields have resulted in an abnormal seasonal increase in gasoline stocks. Distillate fuel-oil yields have not been increased sufficiently to build up stocks to an adequate seasonal level in proportion to increased demand. Consequently, runs will probably be at a level that

will result in at least the usual further increase in gasoline stocks during the first quarter.

"Present indications are that the stocks of finished and unfinished gasoline will approximate new peaks of 80,000,000 barrels on December 31, 1939, and 95,000,000 barrels on March 31, 1940. Any correction of these stock levels will depend primarily on weather conditions and on maximum distillate yields. The bureau's forecast of runs for the first quarter, at about the estimated level for January, is based on the assumption of a possible average distillate yield of about 1 percent higher than the actual for the first quarter of 1939.

"Due to unfavorable exchange and shipping conditions, no large increases in export demand are indicated as yet. As compared to a year ago, exports of lubricants may materially increase and a possible decrease in exports of regular-grade gasoline may be balanced by increased shipments of aviation gasoline."

Discussing the outlook for the coming month, the bureau placed the domestic demand for motor fuel at 39,500,000 barrels, or about 5 percent more than the actual demand in January, 1939. Exports have been estimated as 3,800,000 barrels, 800,000 barrels less than the estimate for the current month, but 160,000 barrels more than the actual last January.

Stocks of finished and unfinished gasoline on October 31 amounted to 73,319,000 barrels, which represented an increase of more than 2,300,000 barrels during October and established a record high for stocks on that date, it was pointed out. Statistics of the American Petroleum Institute indicate a further increase in stocks of 3,250,000 barrels in November, bringing them to about 76,600,000 barrels as of the close of that month.

"These stocks are considerably higher than are necessary and may prove burdensome before the winter is over," the bureau warned. "However, the bureau estimates that finished gasoline stocks will increase 7,300,000 barrels in January, compared with about 7,900,000 barrels in January, 1939."

With benzol and direct sales of natural gasoline estimated at 1,050,000 barrels, a refinery production of 49,550,000 barrels is seen required, which the bureau has distributed among the various districts, as follows:

East Coast, 6,380,000 barrels; Appalachian, 1,910,000 barrels; Indiana-Illinois, 9,030,000 barrels; Oklahoma, 2,890,000 barrels; Kansas-Missouri, 2,470,000 barrels; Inland Texas, 3,630,000 barrels; Texas Gulf Coast, 13,290,000 barrels; Louisiana Gulf Coast, 1,520,000 barrels; Inland Louisiana-Arkansas, 850,000 barrels; Rocky Mountain, 1,280,000 barrels; California, 6,300,000 barrels.

The bureau figured natural gasoline to be blended at the refineries as 7.2 percent of the total gasoline production, or 3,570,000 barrels. The yield of straight-run and cracked gasoline is estimated as 44.1 percent, application of which to the production of 45,980,000 barrels of gasoline gives crude runs of 104,310,000 barrels, or 3,364,800 barrels daily. Foreign crude runs are estimated as 2,300,000 barrels; while exports are placed at 5,750,000 barrels and fuel and losses at 2,900,000 barrels, giving a total demand for domestic crude for January of 110,660,000 barrels, or 3,569,700 barrels daily, which the bureau has allocated among the producing states as shown in the accompanying table.

Estimated Daily Average Crude-Oil Demand by States

(Barrels)

(As no changes in crude-oil stocks are involved in these estimates, they represent demand rather than production)

STATE	Forecast, January, 1940
Texas	1,411,000
California	593,900
Oklahoma	433,900
Illinois	314,800
Louisiana	254,200
Kansas	160,600
New Mexico	101,900
Michigan	61,000
Arkansas	59,700
Wyoming	58,700
Pennsylvania	51,900
Kentucky	12,900
Montana	15,400
New York	13,900
West Virginia	10,000
Ohio	8,100
Indiana	3,900
Colorado	3,900
	3,569,700

Illinois house leader opposes oil bill in special session call

Opposition to inclusion of oil conservation legislation in the call for the proposed special session of the Illinois legislature was expressed last week by Representative Robert J. Branson, Centralia, house majority leader.

Governor Henry Horner recently announced that he was having a bill prepared for possible presentation to the legislature when it next convenes, possibly shortly after the first of the year.

Branson, who represents one of the state's most important oil centers, said he felt consideration of the question by a special session "might do a lot more harm than good."

He added that he was "firmly convinced, after my long years of experience in the legislature, that it is not the thing to do to include this question in the call to be acted upon in a special session. This question is too important to be tampered with in this manner. It should go over until the regular session where it can have a hearing that will be beneficial to all concerned."

The next regular session of the Illinois legislature will convene in January, 1941.

California top allowable is cut; hope to curb drilling

Retention of the state's crude allowable of 599,000 barrels daily for January, 1940, reduction of the top allowable for 712 top wells to 195 barrels daily each, a cut in the power factor and the appointment of a committee to make a thorough investigation of the state's drilling program, to survey of wells now being drilled, and a move to enlist the co-operation of companies in curbing anticipated drilling programs in California, marked the final meeting this year of the Central Committee of California Oil Producers last Thursday.

All three resolutions were adopted unanimously by the committee and indicated that complete harmony still ruled in the central committee that has been handling the oil curtailment program under a voluntary set-up for some years.

The cut in the top allotment for maximum producing wells represents a reduction of 9 barrels daily each over November. Last month the top was 204 barrels daily. It was explained by Lawrence Vander Leck, chairman, that 124 wells were placed on production during December, as against 107 in November. The 124 wells had a potential of 116,583 barrels daily, on an allotment of 16,480 barrels to be handled by the committee.

The central committee has believed for many months that the rapid increase in drilling would upset curtailment and had appointed a committee to study the situation. This committee, headed by C. G. Williams, was again urged last week to investigate present drilling, make a survey of new wells now being drilled and those already scheduled, and make an effort to reduce the number of wells to be drilled in the future by enlisting the co-operation of those companies anticipating or presently engaged in drilling programs.

One way of attacking the problem, according to L. L. Aubert, chairman of the allocation committee, would be to encourage companies to determine if they actually have to drill as many wells as they have programed. It was suggested that it may be possible to string out the number of new wells, although Aubert recognized the many factors that govern the reasons why most wells are drilled. Further, it was indicated that at the present rate of new drilling, it wouldn't be long until it would be unprofitable to bring in new production.

Improvement was also noted in the state's production picture by the committee. For the first 19 days of December, the average daily production was 618,000 barrels; 5500 barrels daily under November for the corresponding period. Vander Leck expected that the state's production would end up the month around 609,000 barrels daily. Another encouraging feature was that the 12-day holiday each month that has been in effect in the Lakeview field throughout the year, may be upped to 15 days as an aid to curtailment.

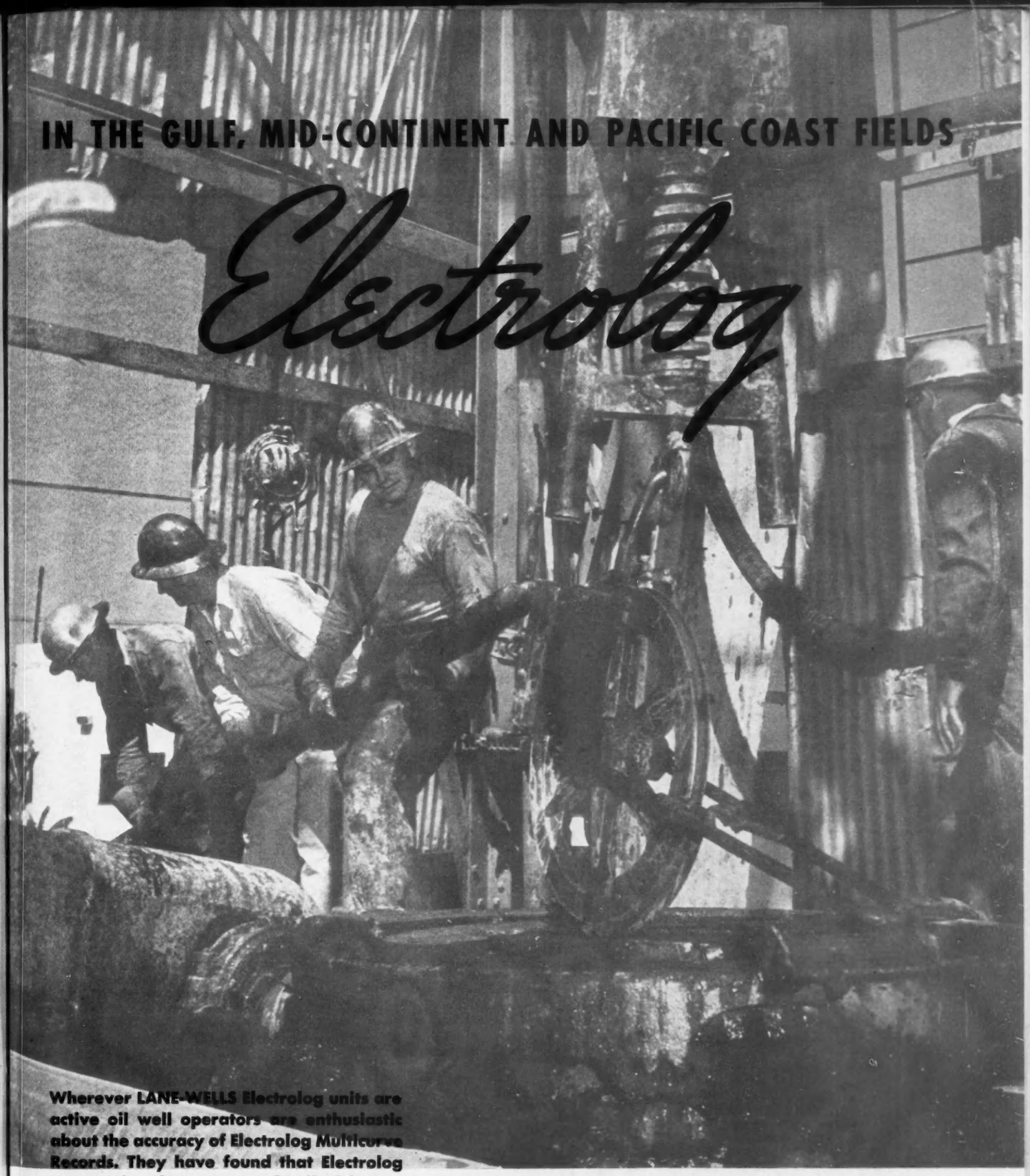
Shutdown exemption asked for several Texas fields

Operators in several Texas fields last week asked the Texas Railroad Commission to exempt their wells from the production holidays that are being imposed. For the most part, the requests were based upon testimony indicating closing of the wells were injurious.

Operators in the Corpus Christi field, Nueces County, declared that reducing production and closing of wells in that area caused an increase in the amount of water produced, especially those making from 50 to 98 percent water. This results in killing the wells in some instances, and expensive work-over jobs. There are 85 wells in the field with a total allowable of 1657 barrels.

A new flow tube has been developed for use in the field that has produced unusual results it was stated. Ordinarily these wells produce with high gas-oil ratios, but by use of the flow tube ratios have been reduced in some instances from 32,000/1 to 3200/1. It is possible that much more oil will be produced than expected previously as a result.

An unusual feature of the testimony was the introduction of evidence as to the financial condition of operators. J. W. Fincher, vice president of the Houston



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National Bank, testified that in some instances operators owed as much as $120,000 on one lease. He urged that they be permitted to produce seven days a week to amortize their debts.

W. F. G. Stein, railroad commission petroleum engineer, testified that he thought the field would benefit from lifting the shutdowns, and that by the use of the flow tube recommended, several wells could have their gas-oil ratios reduced materially.

Wilbarger County

Fain-McGaha Oil Corporation asked that five of its wells on its Waggoner "E" lease in Wilbarger County be exempt from shutdown. The wells are producing from about 1990 feet and produce 247 barrels of water to get 49 barrels of oil a day. The wells are surrounded by dry holes, and the testimony indicated that after a shutdown several days are required to get them back on production.

Continuous operation of wells in the Seven Sisters field, Duval County, was requested. Current allowable is 22 barrels per well for 400 wells. By producing 12 days a month more, the total field production would be increased 100,000 barrels, approximately. The testimony showed that Magnolia, Continental, and Amsco Pipe Line Company would be willing to buy the additional oil to be produced.

Wellington Oil Company presented testimony to show that closing the wells is injurious in some cases and that the field could be operated continuously without physical waste. Lifting costs have gradually increased from $0.28 to $0.98 on some of the wells, and the average for one of the larger leases is about $0.82 a barrel. The crude sells for $0.83.

Adams, Hitchcock and Bradley requested a special allowable for three of their wells in the Leck field, Winkler County. The entire field is now exempt from shutdown because of the large amount of water handled, and a total of 274 barrels was requested for the three wells. The operators insisted that production is a salvage operation. Sinclair Prairie Oil Company presented testimony to show that it is producing between 87 and 90 percent water from its well and asked for an increase to 150 barrels.

Arkansas allowable for January upped 4200 barrels

The Arkansas Oil and Gas Commission last week set the January allowable at 71,200 barrels, an increase of 4200 barrels daily over December. Of the January allowable 28,000 barrels was allocated to settled fields and 43,200 barrels to prorated fields. The prorated fields' allowables for January are: Atlanta, 600 barrels; Buckner, 2700 barrels; Dorcheat (Experiment), 600 barrels; Magnolia, 20,000 barrels; Schuler (Jones sand), 15,000 barrels; Schuler (Reynolds lime), 2800 barrels; and Village, 1500 barrels.

Oklahoma sets January allowable at Bureau quota

January crude allowable for Oklahoma was set at 433,900 barrels daily by the corporation commission, being 3700 barrels under the December allocation but equaling the Bureau of Mines figure. Small adjustments gave unprorated areas a total of 152,010 barrels.

MEN IN THE INDUSTRY'S NEWS

H. L. McQUISTON has joined Hawkeye Oil Company as production superintendent and will have headquarters in Winfield, Kansas. McQuiston formerly acted in the same capacity for Phillips Petroleum Company first in Kansas and later transferred to Oklahoma City. He was chairman of the local chapter of the A. P. I. and also active in other civic organizations. In November, 1938, he

H. L. McQUISTON

became a special representative for Lucey Products Corporation at Fairfield, Illinois.

Hawkeye Oil Company was recently formed by Otis McClintock, Waite Phillips and his son, Elliott Phillips. Executive offices are in Wichita, Kansas. The company paid $600,000 for producing properties in Hittle, Frog Hollow and Zyba pool of Southern Kansas from W. M. McKnab, Winfield.

J. M. RUSSELL, mechanical engineer with Sarawak Oilfields, Limited, Miri, Sarawak, was the honored guest at a luncheon of the Houston Chapter of Nomads December 20.

W. W. CLAWSON, assistant chief geologist for Magnolia Petroleum Company, was elected president of the Dallas Petroleum Geologists at annual meeting held December 18. L. W. MacNaughton, MacNaughton & DeGolyer, and D. M. Collingwood, Sun Oil Company, were chosen vice president and secretary-treasurer, respectively.

P. D. BLACKBURN, superintendent, Magnolia Petroleum Company at Oilton, Oklahoma, has been transferred to Drumright. W. H. Matthews, engineer, Magnolia Petroleum Company at Oilton also will move to Drumright.

M. L. ATKINSON, district superintendent, Phillips Petroleum Company, Seminole, Oklahoma, has been transferred to Odessa, Texas.

HAROLD M. McCLURE, president of Rex Oil & Gas Company, was re-elected president of the Oil and Gas Association of Michigan. George W. Myers, divisional geologist for Sun Oil Company, was chosen vice president to succeed C. L. Maguire of Roosevelt Oil Company. W. B. Pardoe, president of Dapar Oil Company, was re-elected secretary; and W. P. Clarke, Gulf Refining Company and George Talbot, Talbot Oil Company, were re-elected co-treasurers. A. J. Weideman was re-elected executive secretary of the association.

J. K. HUGHES, Mexia civic leader and pioneer operator in the East Texas Woodbine belt, was elected chairman of the board of J. K. Hughes Oil Company at annual directors' meeting December 16. He had served as president since the company was formed in June, 1921. Raymond Dillard, a director, succeeds as president.

J. EDGAR PEW, vice president in charge of production for Sun Oil Company, Philadelphia, accompanied by Mrs. Pew, arrived in Dallas, their former home, late last week to spend the Christmas holidays.

ISH McKNIGHT, West Texas scout for Mid-Continent Petroleum Corporation, Midland, left for Tulsa early last week upon receipt of word that his father had been fatally injured in an accident.

JAMES A. BRAMBLETT, pipe line superintendent at San Angelo, Texas, for Community Natural Gas Company, has resigned to accept a similar position with Roanoke Gas Company, Roanoke, Virginia.

R. E. COLLOM, official of Continental Oil Company, has been elected to head the California Oil and Gas Association for 1940, and William Reinhardt and Torrey H. Webb were elected vice presidents. Harry Westbrook was re-elected secretary-treasurer, while F. E. Foster was continued as managing director and D. S. Kilgour as assistant manager.

NEIL C. NEEDHAM of General Petroleum Corporation, has been named chairman of the Wildcat Committee of the California Oil and Gas Association for the ensuing year.

Approximately 1700 oil men attended the Jinks Wednesday evening at the Biltmore Bowl to view "The Wizard of Ooze," an original play by the wildcats which satirized individuals and operations in the petroleum industry. A program of professional entertainment was tossed in for good measure.

WILLIAM CLARENCE BILLINGS, 54, oil man and rancher, died in Temple, Texas, December 18 and was buried on his extensive ranch near Laredo.

ARTHUR W. ADAMS, 67, active in West Texas oil development the past 11 years, died December 17 at his Fort Stockton, Texas, residence. He had been ill several weeks.

Gasoline market weak; other products strong

The past week was largely a carbon copy of the previous week for the oil industry market situation. Gasoline again was weak, and tank car prices lost more ground in the Oklahoma-Kansas refining region as well as in the marketing areas of the Middle West.

Meanwhile, on the other hand, kerosene and fuel oils were firm, and prices were marked up further in some instances. And lubricants continued in strong demand, domestic and export.

The crude oil markets remained generally steady, with oils desirable for manufacture of lubricants especially strong.

Featuring the crude market last week was an increase of 5 cents a barrel in the posted price for Holloway sand crude in the Cotton Valley field, North Louisiana. The advance was initiated by Standard Oil Company of Louisiana and was met by other purchasers. The prices for Bodcaw and "D" sand crudes in the same field were left unchanged on the gravity scale basis.

Gasoline Market Unsteady

The markets for gasoline were unsteady last week throughout most of the country. The highest asked prices were off ⅛ cent a gallon on all grades, at the refineries as well as in the marketing field. Similarly, the lowest quoted prices also were generally ⅛ cent lower than in the previous week.

The continued decline of gasoline tank car prices has resulted from an oversupply rather than any failure of demand to hold up at satisfactory levels. The industry has been making too much gasoline, and inventories have become seriously burdensome.

Furthermore, any relief from the overstocked situation in coming months appears highly doubtful, as current heavy demand for fuel oils is forcing comparatively large production of gasoline. Only an exceptionally mild winter could do much good, by holding down fuel oil demand and at the same time holding up gasoline consumption. The Bureau of Mines has estimated that gasoline stocks may go to an all-time peak of 95,000,000 barrels by the beginning of spring.

Fuel Oil Situation

Some suppliers on the Atlantic seaboard last week advanced their quotations on kerosene and also on light and heavy fuel oils.

However, additional pressure is being exerted, through publicity, against advancing fuel oil prices. At Washington it was predicted that the Temporary National Economic Committee might inquire into fuel oil price increases, at its next price hearings, in late January. The TNEC probably will ask the industry to justify the higher prices. There have been complaints against rises in prices of both heating oils and industrial fuel oils.

The remarkable strength of the lubricant market has continued, and in some instances prices have been further marked up in Western Pennsylvania and also in the Mid-Continent.

PRODUCT PRICES

	Range Last Week (Cents a gal.)		Late Changes from Week Before	
REFINED GASOLINE				
Oklahoma Refineries:				
62 Octane and Under	4⅛	4⅝	—⅛	...
63-66 Octane	4⅜	4¾	—⅛	—⅛
67-69 Octane	4⅝	5⅛	...	—⅛
70-72 Octane	4⅞	5⅜	—⅛	—⅛
Mid-Western Tank Car:				
62 Octane and Under	4⅛	4⅝	...	...
63-66 Octane	4⅜	4½	—¼	—¼
67-69 Octane	4⅝	5⅛	—⅛	—⅛
70-72 Octane	4⅞	5⅜	—⅛	—⅛
NATURAL GASOLINE				
Grade 26-70:				
F. O. B. Group 3	3	...	—¼	...
F. O. B. Breckenridge, Texas	2¾	...	—¼	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	3⅝	4¼	+⅛	...
42-44 water white	3¾	4⅝	+⅛	...
Mid-Western Tank Car:				
41-43 water white	3⅝	4¼	...	...
42-44 water white	3¾	4⅝	...	...
FUEL OILS				
Mid-Western Tank Car:				
Range Oil	3½	3⅞	...	...
Gas and Fuel Oils:				
No. 1 Prime White	3½	3¾	+⅛	...
No. 1 Straw	3¼	3⅜	...	...
No. 2 Straw	3⅛	3¼	...	...
No. 3 Straw	3	3⅛	...	...
No. 5 (per bbl.)	65	70	...	+5
No. 6 (per bbl.)	45	55	...	+5

Demand from foreign buyers has remained insistent, and domestic requirements have continued large. Supplies of bright stocks and neutral oils are exceptionally scarce, and in many instances, refiners are unable to meet market requirements.

Gasoline stocks increase; fuel oil supply smaller

Further unfavorable trends of operations and inventories were reflected in the petroleum statistics for the week ended December 16. Crude oil production was near the all-time peak, and refinery runs were relatively high, although 45,000 barrels a day lower than in the previous week. Gasoline stocks were increased nearly a million barrels, as output at refineries continued large in relation to current demand. Stocks of both light and heavy fuel oils, on the other hand, were reduced again, as yields of those products continued smaller than desirable, in view of the prevailing large consumption.

Production and Runs

United States crude oil production further increased nearly 40,000 barrels daily, having averaged 3,865,750 barrels a day in the week ended December 16. That was nearly 250,000 barrels a day

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1937:						
August 28	[5]3,731,450	3,425,000	309,506,000	66,997,000	112,111,000	
September 25	3,666,300	[5]3,455,000	307,974,000	65,620,000	116,472,000	
1938:						
March 19	3,433,550	3,080,000	306,380,000	[1]93,192,000	122,067,000	
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
November 26	3,260,900	3,295,000	270,563,000	68,628,000	33,749,000	119,885,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	29,082,000	115,741,000
1939:						
January 28	3,248,250	3,235,000	271,763,000	77,279,000	26,583,000	112,766,000
February 25	3,328,850	3,185,000	271,758,000	84,597,000	23,419,000	110,252,000
March 25	3,382,350	3,225,000	273,915,000	87,561,000	21,487,000	107,551,000
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
May 27	3,585,250	3,405,000	278,289,000	84,152,000	26,992,000	109,386,000
June 24	3,452,800	3,430,000	272,297,000	81,733,000	30,239,000	111,726,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[10]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[1]3,650,000	[3]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 2	3,289,200	3,480,000	234,161,000	76,365,000	37,955,000	110,383,000
December 9	3,827,350	3,460,000	232,016,000	77,196,000	37,087,000	109,291,000
December 16, 1939	3,865,750	3,415,000	.....	78,158,000	36,285,000	107,977,000
December 16, 1938	3,276,300	3,245,000	[4]269,509,000	70,573,000	[8]	[9]
Change in past year	+18.0%	+5.2%	—13.9%	+10.7%	—3.4%	—11.4%

[1] All time peak. [2] Peak for 1939. [3] Lowest since April, 1922. [4] Stocks, December 10, 1938.
[5] Peak prior to 1939. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] Available data for year ago include only stocks at refineries, and not at terminals, in transit, etc., except in California. Those stocks on December 16, 1938, totaled 30,039,000 barrels and comparable stocks on December, 16, 1939, totaled 29,012,000 barrels, or 3.4% less.
[9] Available data for year ago include only stocks at refineries, and not at terminals, in transit, etc., except in California. Those stocks on December 16, 1938, totaled 116,340,000 barrels, and comparable stocks on December 16, 1939, totaled 103,151,000 barrels, or 11.4% less.
[10] Lowest since October, 1922, due to the shutdown of six Mid-Continent states.

more than average daily market demand for the month, as estimated by the Bureau of Mines. It was 18 percent more output than in the corresponding week last year.

Crude runs to stills came down 45,000 barrels to 3,415,000 barrels daily in the week of December 16, and then were 5.2 percent larger than in the comparable week last year.

Gasoline Situation

Production of gasoline was reduced to 11,583,000 barrels for the seven days ended December 16, from 12,027,000 barrels in the previous week, a reduction of 63,000 barrels in the daily average output.

Nevertheless, gasoline stocks continued to increase, having risen almost a million barrels, to 78,158,000 barrels as of December 16 from 77,196,000 barrels December 9. At the new, higher level, the inventory was 10.7 percent larger than that held a year previously. Yet gasoline demand has been running only about 5 percent higher than a year ago, and the improvement is expected to continue around that percentage during the first quarter of 1940, according to the January forecast of the Bureau of Mines.

Fuel Oils

Stocks of heating oils continue to be drawn upon heavily, and they remain comparatively light, in relation to the large current demand. The inventory of gas oil and distillate fuel came down about 800,000 barrels in the week ended December 16. The 36,285,000 barrels on hand at the end of the week represented a supply about 3.4 percent smaller than that held at the corresponding time last year. While the stocks thus are lower than a year ago, the demand for the light oil is running almost 15 percent higher. The Bureau of Mines in its January forecast predicted that demand for distillate fuel in the first three months of 1940 would be around 10 percent greater than that in the corresponding months of 1939.

Inventories of heavy oils also remain comparatively light, considering the large current consumption, induced by the prevailing high rates of industrial production. The stocks of residual fuel in the United States were reduced approximately 1,300,000 barrels in the week ended December 16, having declined to 107,977,000 barrels. At that level they were 11.4 percent lower than one year previously. In contrast, demand for heavy fuel oil has been running better than 10 percent higher than a year ago.

Stocks of crude oil continue to fluctuate considerably from week to week, because of erratic production in Texas, under the shutdown system of proration. The national inventory of crude came down to 232,016,000 barrels as of December 9 from 234,161,000 barrels a week earlier. The remaining supply was 13.9 percent larger than that held at the corresponding time a year ago.

U. S. could double output of aviation gasoline

Production of aviation gasoline in the United States could be stepped up practically overnight from the 859,000 barrels actually produced in October to approximately 1,500,000 barrels a month, one third of which would be in California and the remaining two thirds east of that state, it was learned by the Bureau of Mines last week in a survey of the situation.

The first government study ever to be made of this branch of the oil industry, the inquiry was undertaken as part of a special survey of strategic materials of which the administration is anxious and to build up adequate reserves for use in the event of a national defense emergency.

With the information regarding October activities as a basis, the bureau hereafter will publish monthly figures of production, stocks and demand as part of its regular monthly petroleum statement, it was announced.

The bureau's report, issued December 21, showed that October production included 265,000 barrels in California and 894,000 barrels in other states, which was equivalent to 1.6 percent of the total output of motor fuel for the month.

Several hundred refiners were covered by the canvass, but the reports indicated that only about 25 were producing aviation gasoline, and that it is being made by a great variety of methods, including the "common" ones such

United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Dec.)	State Allowable in Dec.	BARRELS DAILY FOR WEEK ENDED Dec. 23	Dec. 16
TEXAS—				
Texas Panhandle	.....	.....	80,050	76,050
North Texas	.....	.....	97,500	97,350
West Central Texas	.....	.....	33,250	34,650
West Texas	.....	.....	270,300	267,800
East Central Texas	.....	.....	98,100	93,350
East Texas Field	.....	.....	495,000	489,200
South Texas	.....	.....	240,500	246,750
Texas Gulf Coast	.....	.....	260,150	254,200
Total Texas	1,438,100	1,402,673*	1,574,850	1,559,350
CALIFORNIA—				
Long Beach	.....	.....	44,500	44,500
Santa Fe Springs	.....	.....	26,200	26,100
Huntington Beach	.....	.....	28,200	27,600
Dominguez	.....	.....	19,600	17,100
Ventura Avenue	.....	.....	37,400	37,200
Midway-Sunset	.....	.....	55,100	53,100
Kettleman Hills	.....	.....	52,300	51,600
Wilmington	.....	.....	87,200	86,500
Others	.....	.....	269,400	275,800
Total California	594,500	599,000†	619,900	619,500
OKLAHOMA—				
Oklahoma City	.....	.....	109,150	108,900
Seminole Area	.....	.....	109,450	110,025
Fitts	.....	.....	21,300	21,100
Others	.....	.....	195,775	192,140
Total Oklahoma	437,600	437,600	435,675	432,265
ILLINOIS—				
New Pools	.....	.....	332,250	327,900
Old Pools	.....	.....	7,950	8,000
Total Illinois	315,200	.....	340,200	335,900

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Dec.)	State Allowable in Dec.	BARRELS DAILY FOR WEEK ENDED Dec. 23	Dec. 16
LOUISIANA—				
North Louisiana	.....	.....	70,050	69,250
South Louisiana	.....	.....	205,600	201,200
Total Louisiana	255,200	255,200	275,650	270,450
KANSAS—				
Burrton-Haven	.....	.....	10,250	10,750
Russell County	.....	.....	28,050	27,600
Silica	.....	.....	12,350	12,200
Others	.....	.....	133,100	131,900
Total Kansas	168,000	168,000	183,750	182,450
NEW MEXICO	110,000	110,000	112,100	111,000
EASTERN STATES—				
Pennsylvania Grade	.....	.....	77,250	75,500
Others, Eastern	.....	.....	26,050	25,900
Total Eastern States	104,600	.....	103,300	101,400
MOUNTAIN STATES—				
Wyoming	60,000	.....	64,600	67,100
Montana	15,200	.....	17,600	17,100
Colorado	4,200	.....	3,700	3,900
Total Mountain States	79,400	.....	85,900	88,100
MICHIGAN	61,000	65,000	66,900	65,050
ARKANSAS	56,100	72,000	69,150	68,900
MISSISSIPPI	.....	.....	2,250	2,000
‡Total 8 Prorated States	3,120,500	3,116,437	3,337,975	3,308,965
Total United States	3,619,700	.....	3,869,625	3,836,365

* Daily average, considering 12 shutdown days, and various exemptions.
† Recommendation of Central Committee of California Oil Producers.
‡ Texas, California, Louisiana, Oklahoma, Kansas, New Mexico, Arkansas, Michigan.

as the leading of selected straight-run fractions, polymerization-hydrogenation, catalytic cracking-reforming and catalytic alkylation.

The octane rating of the various grades reported ranged from about 70 to 100, with a weighted average of 84 (A.S.T.M.), the bureau reported. This, it was commented, was lower than had been expected, indicating that a large number of relatively-low-compression motors are still in use both here and abroad. The average of 84 octane compares with about 72 for the regular grade gasolines now being sold. The vapor pressure of most of the aviation gasolines was seven pounds, but the weighted average was 6.6 pounds, comparing with about 7.5 pounds for regular gasolines sold in summer and about 10 pounds for winter grades.

Stocks of aviation gasoline on hand at refineries and bulk terminals on October 31 was reported by the bureau as 2,400,000 barrels, of which 842,000 barrels was in California, but part of these stocks had been sold for some time and was awaiting shipment at the end of the month.

Figures on exports, compiled by the Department of Commerce since the beginning of 1939, show shipments of 553,000 barrels in January, 182,000 in February, 392,000 in March, 323,000 in April, 692,000 in May, 466,000 in June, 266,000 in July, 221,000 in August, 206,000 in September and 287,000 in October.

It was pointed out by the bureau that as the stock figure for September 30 was not obtained, domestic demand for October cannot be calculated accurately, but that production less exports gives 602,000 barrels for domestic demand and increase in stocks. In 1938, total domestic consumption by aircraft was about 100,000,000 gallons, or about 200,000 barrels monthly, and it was suggested that while there may have been a rapid increase in consumption during the past year, the figures suggest a substantial stock accumulation in October.

More consumers used less natural gas during 1938

Reversing the upward trend of the preceding four years, marketed natural gas in 1938 dropped 5 percent from the peak of 2,407,620,000,000 cubic feet reached in 1937 to 2,295,562,000,000 cubic feet, it was reported December 19 by the Bureau of Mines.

Final report of the bureau for 1938 showed that consumption (marketed production less net exports) also decleased almost 5 percent, from 2,403,041,000,000 cubic feet in 1937 to 2,294,097,000,000 cubic feet in 1938, with all of the major classes of consumption except field use decreasing but with the heaviest drop in miscellaneous industrial uses, following the industrial recession in 1938.

Value of natural gas at the wells declined from an average of 5.1 cents in 1937 to 4.9 cents in 1938. This decline reflected further decreases in the prices paid for the large amounts of low-priced gas used in the field and in carbon-black manufacture, primarily in Texas and Oklahoma. The average value at points of consumption declined from 21.9 to 21.8 cents, and the average price for domestic and commercial gas advanced 0.7 cent but the average price for industrial use, other than field and carbon-black manufacture, declined by the same amount.

Analysis of the 1938 consumption showed that 659,203,000,000 cubic feet, or 29 percent, was in field use; 367,772,000,000 cubic feet, or 16 percent, domestic consumption; 114,296,000,000 cubic feet, or 5 percent, commercial consumption; 324,950,000,000 cubic feet, or 14 percent, carbon-black manufacture; 169,988,000,000 cubic feet, or 7 percent, fuel in electric public-utility power plants; 109,741,000,000 cubic feet, or 5 percent, fuel in petroleum refineries; 37,336,000,000 cubic feet, or 2 percent, fuel in cement plants; and 510,811,000,000 cubic feet, or 22 percent, for all other industrial purposes. Except for field use, which increased about 1 percent, all classes of consumption were under 1937, the largest decrease being in miscellaneous industrial purposes, which went down almost 15 percent.

The total number of domestic and commercial consumers increased from 9,028,180 in 1937 to 9,338,210 in 1938, despite a decrease of over 1 percent in the total amount of gas utilized by such consumers, the bureau found. The average amount of gas used per consumer decreased from 54,200 cubic feet in 1937 to 51,600 cubic feet in 1938.

Of the total 1938 consumption, it was said, 55,825,000,000 cubic feet was mixed with manufactured gas, and there were 2,381,710 domestic and commercial consumers of mixed gas in 1938 compared with 2,410,610 the previous year.

There were 53,770 gas wells in use at the end of 1938 compared with 55,050 at the beginning of the year, the bureau reported; 2236 wells were drilled in 1938, which indicates that 3516 wells were abandoned or shut in during the year, compared with 2284 in 1937.

Interstate and export movement of natural gas decreased from 687,428,000,000 cubic feet in 1937 to 636,626,000,000 cubic feet in 1938, or 7 percent. Most of the major movements between states decreased, the outstanding exception being that from New York to Pennsylvania, which increased from 9,925,000,000 to 22,350,000,000 cubic feet. Imports from Canada, all into Montana, were 372,000,000 cubic feet, compared with 289,000,000 cubic feet in 1937, but exports to Mexico fell from 4,790,000,000 to 1,743,000,000 cubic feet.

PIPE LINE NEWS

Start southeastern gasoline line in mid-January

Construction on Southeastern Pipe Line Company's $5,000,000 gasoline line from Port St. Joe, Florida to Lockout Mountain, Georgia, will begin in mid-January, according to engineering schedules reported in company headquarters at Atlanta. Principal owners of the company are The Pure Oil Company and Gulf Oil Corporation.

Ocean-going tankers will bring gasoline from The Pure Oil Company's refinery at Port Neches, Texas, and Gulf Refining Company's plant at Port Arthur, Texas, to the southern terminus of the line on the Western Florida Gulf Coast. The line, which is expected to be in service by early summer, will be of 8-inch to Atlanta and 6-inch from Atlanta to Lockout Mountain.

Work to start immediately on 93-mile West Texas line

Construction work on the Basin Pipe Line Company's proposed 93-mile 6-inch crude line from Wasson field, Gaines-Yoakum County sector of West Texas, to the Big Spring refinery of Cosden Petroleum Corporation will be underway within two weeks, according to Claude L. McIver, president. An order for the pipe was placed late last week through Brown & Root, Inc., Austin, Texas, contracting firm that is underwriting the project.

The field gathering system, involving 15 miles of 4- and 6-inch pipe and two 20,000-barrel stock tanks, will be built and pressed into service in order to begin running oil by February 15. O. C. Whitaker Company, Fort Worth, has the contract to build the lines, and will start work on the field end with order to utilize the finished portion of the line for backing up crude. A field station and an intermediate booster to be located near Lamesa will give the line a rated capacity of 12,000 barrels daily.

Work to start immediately on Panhandle Eastern loops

Panhandle Eastern Pipe Line Company has awarded contracts for a $3,500,000 expansion program which consists principally of installation of 137 miles of 24- and 22-inch main line loops, to add between 25,000,000 and 30,000,000 cubic feet per day to the present capacity.

Loops will be in Kansas, Missouri and Illinois. The program includes installation of an additional 1000 horsepower compressor unit at Glenarm station near Springfield, Illinois. Additions also will be made to the gasoline extraction and dehydration plant near Liberal, Kansas.

Contracts for loop construction have been awarded T. R. Jones and I. C. Little, Dallas. Construction will commence immediately with expectation that the work will be completed by late winter or early spring.

New Mexico gas line

New Mexico Gas Company, a unit of Southern Union Gas Company, Dallas, Texas, has authorized construction of a 31-mile 5-9/16-inch natural gas line south from its trunk line terminal at Albuquerque to Belen, New Mexico. Work will begin this week. Gas is obtained from the San Juan Basin district in northwestern New Mexico.

New Mexico Gas Company, an affiliate, will build a 16-mile 4-inch extension early next year east from Carlsbad, New Mexico, to an industrial plant in Eddy County.

WORLD-WIDE DEVELOPMENTS

Edited by WM. V. GROSS, Associate Editor

Mexico

Poza Rica well completion highlight of Mexico work

Completion of a 7500-barrel producer at 7970 feet in the rich Poza Rica field by the government oil administration and reported letting of contract by the Compania Petrolera Veracruzana, S. A., Japanese controlled company, for the drilling of 20 to 25 wells in the Rayon section north of the Tamesi river in the state of Tamaulipas are among the more important recent operation developments in the Mexican industry.

The Poza Rica producer, No. 34, was brought in by that section of Petroleos Mexicanos working the former Aguila (Mexican Eagle) properties. The well was spudded April 26.

Other Completions

The government also completed the Rincon 23-A in Chapacao area, formerly held by Mexican Petroleum Company, a Standard of New Jersey subsidiary, for 500 barrels initial yield at 1580 feet. The past July 29, the Rincon 26, in the same area, was completed for 300 barrels at 1309 feet.

The area to be drilled by the Veracruzana is north of the Tamesi River from the Ebano development formerly held by Standard Oil Company of New Jersey's subsidiary in the general area know as Panuco. The drilling contract for all the operations has been let to an American.

Two holes were put down in this Rayon area some time ago by an operator named Alba—Nos. 1 and 3-A—in which he got a little show. Another operation in the area was sunk to 2600 feet in 1913 only to tap sulphur water. The producing horizon in the area is at about 1500 feet as compared with 2000 feet in Ebano south of the river. Live seeps in the area, suggesting fracture there, are considered to have influenced Veracruzana's plans to drill.

Veracruzana, also operating in the San Carlos district of the Isthmus of Tehuantepec, has abandoned No. 3 and is spudding in No. 4. The company has one small producer, 25 to 30 barrels a day, near the village of San Carlos.

Poza Rica Busy

The government's Petronac 10, being drilled by Petronac, old government organization formed prior to expropriation (reports of plans for general consolidation of this with Petroleos Mexicanos are prevalent), was recently abandoned at 6710 feet on account of difficulty with the hole. The location is on the crest of the rich Poza Rica structure and completion would have probably meant a good well.

Operations the middle of December in the Poza Rica field showed 1 well drilling, 2 rigs up, 2 locations, 1 shutdown, 2 cementing operations and 1 hole abandoned. Detailed report is as follows:

Poza Rica 23, spudded in January 20, 1938, shut down at 6931 feet; Poza Rica 35, spudded in July 21, cemented for 6-inch at 7450 feet; Poza Rica 38, spudded in August 25, drilling at 4157 feet; Poza Rica 42, spudded in December 7, cementing 13-inch at 739 feet;

Poza Rica 43, rigging up; Poza Rica 45 and 46, clearing locations. These operations are being carried on by the former Aguila syndicate of Petroleos Mexicanos.

Poza Rica operations by the old Petronac administration showed Petronac 9 rigging up.

In the Rancho Abajo area, a small field on the eastern flank of the Golden Lane, the government (on a percentage basis with C. W. Kennedy) spudded in Petromex 64 September 23. The hole is 1718 feet deep, waiting on 6-inch.

In the fabulous Potrero del Llano area, located in the heart of the Golden Lane, Petronac, working on a percentage basis with Budde and Black, is building derrick for Petronac Buena Vista 1. Mexican Eagle Oil Company took 103,700,000 barrels of oil out of this property prior to expropriation.

In Northeastern Mexico, on La Presa structure near the town of Mier in the state of Tamaulipas, Ohio Mex Oil Company is drilling at 4480 feet on La Presa 4, spudded July 15. This is a deep test, offsetting 2 shallow gas wells from which gas is being moved to Monterrey. In the same area F. C. Martinez spudded Lajitos 2 December 1 and is drilling at 635 feet.

Operations on the Chapacao property, formerly held by the Mexican Petroleum Company, in Panuco field, where 1 well was completed in November for 500 barrels are as follows: Rincon 24, spudded in August 11, to acidize at 1825 feet; Chijol 132, spudded in November 15, cemented 8-inch at 1216 feet; Pedro 38, rigging up.

Producing wells in all Mexico total 1145. These are divided as follows: In the North (Panuco) Field, 659; Southern, 262; Poza Rica, 24; Isthmus of Tehuantepec, 200.

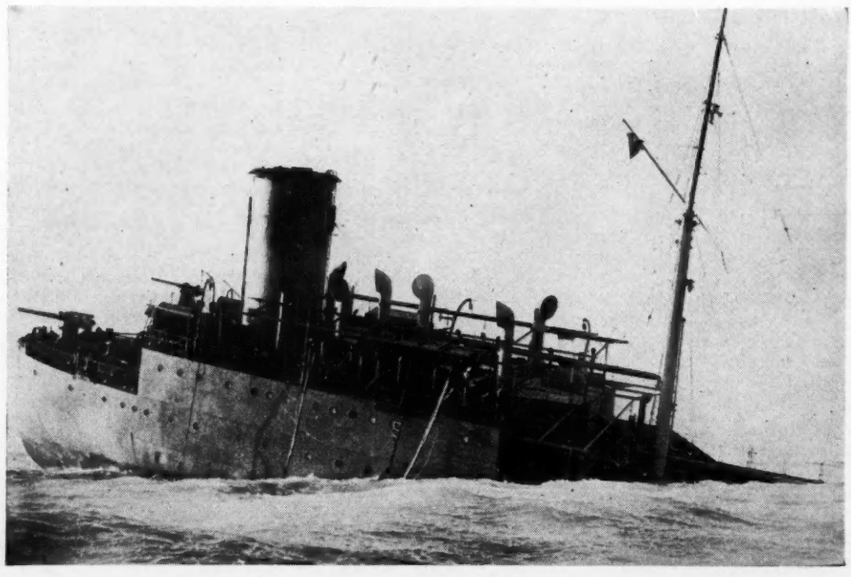
The average daily production of Mexico in October was 140,000 barrels. Of this the 24 wells in Poza Rica yielded 89,500 barrels, the other 1121 wells producing 50,500 barrels.

Japan

Japanese firm pays cash for Mexican crude oil

Long repeated reports of the possibility of Japan's becoming a market for Mexican petroleum gained some confirmation recently in the negotiation of a cash deal between the Mexican petroleum administration and Compania Petrolera Laguna, S.A., Japanese controlled company operating in Mexico, for 50,000 metric tons of oil (about 313,000 barrels) at a price of 90 cents, with 5 cents a barrel commission for handling company, making the net to Mexico 85 cents a barrel.

First cargo of 85,000 barrels under this deal moved out in November in Japanese vessel, the Kaijo Maru, from Tuxpam. Other shipments will be made as required.



—International News Photo.

The well-armed English tanker San Caliston settles beneath the waves off the coast of England after striking two mines put down by Germans.

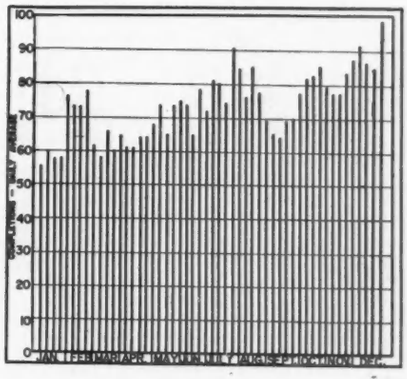
U. S. FIELD OPERATIONS

FIELD operations continue unabated as the year draws to a close while completions during the week totaled 697 to establish a mark that has not been approached since 1930. Texas led with 239 completions. Illinois turned in 148; more than Oklahoma, Kansas, Louisiana, and Michigan combined.

Something of a record was established when a West Montebello test landed 7630 feet of 7-inch casing and obtained circulation in 6 hours and 45 minutes. The state also reported extension of West Edison and Dominguez field.

Half-mile extensions were recorded for Wise Township pool of Isabella County and Dundee Township of Monroe County, Michigan, while an Ottawa County wildcat logged Traverse saturation. Devonian was definitely proven as a new pay zone for Centralia by a 500-barrel well, while a Clinton County, Illinois, well had Benoist saturation. In South Louisiana well on Pigeon Bayou prospect, Iberia Parish, promises a new field, and West Lake Verrett, St. Martin Parish, and North Cowley, Acadia Parish, got new sands. Nebraska's discovery well in Richardson County swabbed 144 barrels daily when plugged back. Kansas had extensions of ½ mile for Cunningham and Hodge pools and indication of a 2-mile extension for Bornholdt.

Texas Gulf Coast developments included a new sand at Anchor, Brazoria County, which extended the field 6000 feet, a half-mile extension of Collegeport gas field, and a second well in the new deep pay at Clam Lake, Jefferson County. South Texas discovered a basal Frio or upper Vicksburg sand field near Hoffman, Duval County, and conversion of Green prospect, Karnes County, into a gas field. In this area shallow production was opened in Guadalupe County and the West-Vanderbilt area, Jackson County, got a 14,000-foot extension, in addition to extensions for Cologne and Magnolia City.



Drilling at Highest Level at Year End

Illinois

Devonian definitely productive in Centralia field

Mattoon, Ill. — The Devonian lime horizon was definitely added to the Centralia field of Clinton and Marion counties last week when Louis Lilly et al's Dave Gum 1, 450 feet from the south line and 725 feet from the east line, NE Lot 24, Block 1, Pullen Subdivision No. 3 of Centralia townsite, started flowing immediately when perforating casing with 24 shots opposite one of several pay sections at 2902-06 feet. The deep test, first for this field, is just outside the city limits of Centralia and is estimated by operators to be good for 500 barrels daily without further treatment. Thirty feet of Devonian pay was drilled, but only the upper 8 feet were relatively free of water.

At an elevation of 498 feet, this well had the Benoist at 1393 feet, Aux Vases at 1406 feet, lower O'Hara at 1509 feet, Rosiclare at 1525 feet, Fredonia at 1557 feet, St. Louis at 1649 feet, Salem at 1764 feet, Osage at 2099 feet, Osage sand at 2198 feet, Louisiana lime at 2788 feet, Chattanooga at 2792 feet, and Devonian at 2886 feet.

Just what effect the well would have upon townsite drilling in that portion of the field within the city limits remained in doubt as the Centralia city council continued to debate the advisability of further limiting drilling, now confined to two wells to a city block. No drilling permits have as yet been issued for tests within the city. As an outcome of a meeting last week, a committee of five operators are to meet with City Engineer H. B. Stow to consider zoning the area. Members of the committee are John Pugh, chairman, C. J. Haas, J. W. Menhall, J. A. Matthews and Louis C. Simmel.

The second Devonian well in the Lake Centralia-Salem field was completed last week, flowing 3889 barrels in 24 hours after a 1000-gallon acid treatment. It is Magnolia Petroleum Company's W. B. Young 28, NE SW NE 20-2n-2e, producing from a pay section between 3372 and 3407 feet. This operator's J. H. Young 66, 77 feet from the west line and 151 feet from the north line, SW 21-2n-2e, was drilling plug for a test of the Devonian; and four other Devonian tests were announced for the W. B. Young, S. Shanafelt and J. R. Young leases, all held by Magnolia.

Oil was reported in the hole at Max Pray's and Claude Bell's Knolhoff 1, NW SW SW 2-1n-2w, Clinton County, as the wildcat began preparations for swabbing. Casing was set to 5 feet of Benoist saturation topped at 1324 feet. The wildcat was originally started as a test of the Devonian lime.

C. A. Evarts' Peter Trapp 1, SE NE NE 6-1s-12w, wildcat 3 miles north of Mt. Carmel, Wabash County, filled rapidly with salt water when plug was drilled. Casing had been set to 12 feet of Cypress sand saturation. Now shut down, the test may be carried to the McClosky. Between Trapp 1 and Mt. Carmel city limits, O'Mera Brothers were spudding Dr. J. C. Utter 1, SE SE NE 17-1s-12w.

A west outpost to the Storms field of White County, W. R. Hayes' Amos Orman 1, NW SE NW 18-6s-10e, plugged back to the Aux Vases when only a show of oil was obtained on perforating casing in the McClosky.

Henderson Bros.' J. Ostermeier 1, C NW NW NW 30-10n-4w, Montgomery County, drilled 10 feet of saturation below 615 feet. The wildcat will be shot.

Indiana

Knox County test finds too much water with oil in Cypress

Evansville, Ind.—Horton & Wiggins' State Life Insurance 1, SW SW NW 14-1s-12w, wildcat in Decker Township, southeastern Knox County, had a show of oil in the Cypress but it had a water content too heavy for a commercial producer. It is being deepened for a test of the McClosky.

The twelfth gas well in the Rockport field of Spencer County was registered last week. Kentucky Natural Gas Company's Hall-Pattie (Sallie Boyd Hall) 1, 660 feet from the south line and 660 feet from the west line, SW SW 29-7s-6w, was estimated to be good for 3,000,000 cubic feet daily. This company is laying a 6-inch line to connect the field with its system in Kentucky. It should be in service within 30 days.

Inez Montgomery 1, wildcat in SE NE NE 9-4s-12w, Smith Township, Posey County, has been taken over from Kenilind Oil Corporation by A. C. Thomas, Ray Ryan and others. Inactive for several months, it is now drilling below 1000 feet. Contractors are R. L. Bauman and L. F. Boone.

A wildcat failure and a first report were registered in Posey County during the week. Sun Oil Company's Julia

Gettman 1, NW SW SE 35-6s-12w, topped the Hardinsburg at 2142 feet and was plugged at 2168 feet. Joe Minton et al's Hill 1, 5030 feet from the east line and 1660 feet from the north line, Section 7-4s-13w, was a location.

Sulphur water brought abandonment of Frank Damron's Humbert 3, 400 feet from the north line and 400 feet from the east line, SW SW 15-1s-4w, Dubois County wildcat, at 690 feet.

Three other wildcats were among the week's first reports. In Gibson County, Fotaides' Fleener 1, SE NW SE 21-3s-12w, was moving in material, and J. E. Amis' Dunn 1, 50 feet from the north line and 100 feet from the west line, NW NE 19-3s-13w, was drilling at 1300 feet. In Perry County, Hawk & Damron's Dotterweich 1, SE NE SW 8-4s-3w, was a rig.

Kentucky

Davies County wildcat quits, another one is started

Owensboro, Ky.—I. C. Huff and associates were rigging up machine for a wildcat on the Ambrose tract, 2550 feet from the north line and 4100 feet from the west line, Section 5-N-31, Daviess County.

Sole wildcat completion of the week was A. D. Schaeffer et al's Dr. Medley 1, 144 feet from the west line and 1001 feet from the north line, Section 3-P-29, Daviess County, which was plugged at 1571 feet.

In Henderson County, T. L. Boyce's A. Walker 1, wildcat 3960 feet from the east line and 520 feet from the north line, Section 10-N-24, was shut down at about 2000 feet.

Forest City Basin

Discovery well makes 144 barrels when plugged back

Falls City, Neb.—Pawnee Royalty Company's Boice 1, C NE NE 18-1n-16e, Richardson County discovery, swabbed 144 barrels in 24 hours from a plug back depth of 2279 feet. Previous total depth was 2288 feet in Viola lime and 8-inch casing was set at 2240 feet. Due to cavings the well went dead to end its 60-day pumping test for first commercial production in Nebraska after it had pumped 1174 barrels in the 19 days. Only a slight amount of water showed on the last swabbing test. Operators were underreaming the 8-inch and will cement it at 2240 feet. Same company's Meyers 1, C NW NW 24-1n-15e, set 1225 feet of 12½-inch pipe and were drilling below 1750 feet.

Circulation was lost at California-Nebraska Oil Limited's Steuhm 1, NWc 21-14n-37w, around 3270 feet. Mud was being reconditioned for drilling ahead.

Twenty-acre spacing for Caplen field

The Texas Railroad Commission issued an order last week providing for 20-acre spacing in the new Caplen field, located on Bolivar Peninsula in Galveston County. The rules provide for straight acreage proration.

Oklahoma

Kingfisher wildcat produces; open Arbuckle at Birch Creek

Tulsa. — Mid-Continent Petroleum Corporation completed the thirty-third producer within the community block at Ramsey pool, Payne County, as Wetzel 3, NW NE SE 13-18n-1e, southwest portion of the pool, flowed 252 barrels the first hour and 212 barrels the second with 3,500,000 cubic feet of gas from Wilcox sand at 4756-78 feet. Potential was set at 5577 barrels daily.

Anderson-Prichard Oil Corporation et al's Geis 1, C NE SW 15-18n-9w, 6 miles north of Loyal, Kingfisher County, was completed for the initial producer for the county. It gauged 2,750,000 cubic feet of gas and 10 to 12 barrels of distillate from a plug-back depth of 7365 feet. Pay horizon is Oswego lime, topped at 6870 feet and 7-inch casing was set at 7340 feet. The lime was too hard to take acid as over 7000 gallons were pumped under pressure in order to increase production.

Arbuckle lime was a new horizon in Birch Creek pool, Osage County. Peters Oil Company and Norbla Drilling Company's Osage 3, NWc SE 4-23n-10e, topped Arbuckle lime at 2472 feet and gauged 18,700,000 cubic feet of gas at 2125 feet. After acidizing at 2488 feet, a pumping potential of 7 barrels of oil and 15 barrels of water was made. Deepening to 2501 feet failed to increase flow.

W. R. Ramsey and others abandoned Mansfield 1, C NW NE 16-14n-9w, near Calumet, Canadian County. The test was drilled to 9611 feet but did not show in upper perforations.

Sinclair Prairie Oil Company's Ward 1, SEc 30-7n-1e, 7 miles east of Lexington, was abandoned at 6225 feet. A depth of 8310 feet was reached in the lime but an electric log showed water through the stratum.

Patsy Oil Company's Garrett 1, NW NE NE 16-5n-3e, Viola lime discovery well in McClain County, flowed 968 barrels in 21½ hours. C. W. Roodhouse staked a north offset to this producer at Bond 1, SW SE NE 9-5n-3e and work was starting immediately. Edgeman 1, NE NW NE 16-5n-3e, was staked as an east offset by Patsy Oil Company.

North Shawnee pool, Pottawatomie County, received its second producer. Atlantic Refining Company et al's Netha 2, NE SE NE 24-11n-4e, filled 3500 feet with oil after drilling Wilcox sand at 4867-90 feet. This pool was opened in 1937 by Mid-Continent Petroleum Corporation's Netha 1, SEc NE 34-11n-4e, which made 220 barrels daily from the Wilcox sand at 4875 feet. Dry holes have been drilled in Section 19 and in Section 25.

R. W. McLaughlin et al's Herrington 1, C SW SE 26-9n-25w, southeast of Erick, Western Beckham County, was a wildcat location. Location is on block of 2500 acres and contract depth is 2800 feet, cable tools being operated by Bud Lewis, Sayre. The major Amarillo anticline which extends from the Wichita mountains in Oklahoma through the Amarillo field of the Texas Panhandle has long been thought a favorable trend. Two gas pools, Erick and Sayre pools, have already been discovered on this structure.

H. E. Campbell had a hole full of oil with some water at Walden 1, SWc NE 5-18n-18e, four miles of Wagoner pool, Wagoner County. Arbuckle lime was drilled to 835 feet and pipe was set for a production test.

Kansas

Skelly extends Cunningham pool half-mile northwest

Wichita.—Skelly Oil Company extended Cunningham pool, Kingman and Pratt counties, ½ mile northwest at Harding 1, C SW 7-28-11w, which made a daily potential of 374 barrels. The producer was drilled to 4283 feet in Viola lime.

W. C. McBride had a hole full of oil at Hodge 1, C SL SE NE 25-20-6w, ½ mile southeast of Hodge pool, Rice County. Mississippi lime was topped at 3274 feet and drilled to 3324 feet. Eight-inch casing was landed at 3278 feet. Pay zones were recorded at 3311-16 feet and 3321-24 feet. This is the second producer for the pool.

A 2-mile northward extension was indicated for Bornholdt pool, Rice and McPherson counties. Central Petroleum Company and Springrose Drilling Company's Swanson 1, C N½ NW NW 18-20-5w, topped Chat at 3304 feet and drilled in 15 feet, getting saturation. Casing was run and plugs will be drilled shortly. This wildcat checked approximately 100 feet higher on this horizon than a recent dry hole drilled by Sunray Oil Company in 17-20-5w, and checked only a foot lower than production in the Hodge pool, west of Bornholdt.

Two important wildcats were staked in Northwestern Kansas. Cities Service Oil Company staked location for Victory Life 1, NEc 36-13-30w, 43 miles southwest of nearest production, Wakeeney pool in Trego County. Considerable core drilling has been done in the area and location was made in the northwest portion of the structure. In Rawlins County, George A. Dye made location for Howland 1, SEc 32-2-32w, 6 miles east of Atwood. It is a proposed 6000-foot test.

A ½ mile north of Letsch pool, Russell County, Stanolind Oil & Gas Company's Bond 1, CSL SE SW 23-14-13w, filled 2400 feet with oil and casing was run for a test. Arbuckle lime was topped at 3192 feet and drilled to 3196 feet.

Shell Oil Company's Smith 1, SEc SW 9-21-11w, between Snider and Snider South pools, Stafford County, topped Arbuckle lime at 3403 feet and cored only spotted saturation in white dolomite at 3410-15 feet and were coring ahead, although its chances for production are slight.

W. C. McBride's Soderstrom 1, CSL NW NE 21-17-13w, three locations northeast of Soderstrom Arbuckle lime pool, Barton County, had a show of oil in Lansing lime at 3268-80 feet and a slight show of oil in Arbuckle at 3280-82 feet. Eight-inch casing was run to bottom for a test.

North Texas

Nocona deep well makes 40 barrels oil in 30 minutes

Wichita Falls.—Preliminary production test given Stanolind Oil & Gas Company's Davis 2, previously indicated Bend lime strike for the Nocona deep area, Montague County, credits the well with 40 barrels of oil in 30 minutes natural after drilling plugs from 5½-inch pipe at 5223 feet. This north edge location logged saturation, based on electrical survey, at 5232-46 feet, and is bottomed at 5254 feet. It was carried to the Bend, topped at 5202 feet, after failing to make a producer in the 4300- and 4600-foot Strawn zones. This new oil horizon was not present in Rogers & Rogers' Astley-Texaco 1, north offset to the pool discovery, as the latter was carried to the Ellenberger at 5390-5489 feet, then plugged back for flowing production in the second Strawn.

Development work in the Nocona pool will be carried to the northwest edge of the city limits through the staking of a location by Youngblood and Foree, discoverers of the 4300-foot pay, on a unitized tract of 20½ acres in the Hillcrest addition.

Production test was due late last week on Walter Gant and Continental Oil Company's Brown 1, western Montague County wildcat, that logged numerous oil showings in the lower Pennsylvanian. Seven-inch pipe was cemented at 6843 feet in Bend, topped at 6112 feet, and the hole is bottomed at 6904 feet.

Sinclair Prairie Oil Company has made location for B. H. Howard 1, near most southwesterly corner of 100-acre tract, W. Wallace Survey, A-841, for a 5000-foot test on its block, centering immediately west of the town of Bonita. Grimes-Feagin-Youngblood & Foree's Admire 1, 4 miles northwest of Bonita, was due to abandon at 4520 feet.

Big Indian Oil & Development Company's Morton 1, SW E. T. Ry. Section 1, A-365, Cooke County wildcat and 6 miles southeast of Gainesville, is rated at 25 barrels of 27-gravity oil daily on swabbing tests from broken sand at 2509-17 feet. The company gave Cooke County its first oil production November, 1924, in completing Davis 1, Block 9, Fannin County School Lands Survey, as a 25-barrel well from sand at 3519-29 feet. This original well continues to make 10 barrels daily, although it is partially surrounded by failures.

Jones Drilling Company and Dilworth Hager's Armstrong 1, mile northwest extension for the Bolivar oil pool, Denton County, flowed 19¾ barrels of 40-gravity oil initial from broken pay at 1616-26 feet. A small nitro shot is scheduled before completion. The partnership contracted to start a test to the west within 4 months in acquiring lease on the west 116 acres of the Armstrong tract for $50 per acre, half cash.

British American Oil Producing Company's Holman 1, SW NE TE&L Section 194, Baylor County wildcat and 2½ miles southwest of Maybelle, was due to recement casing after testing few gallons of oil with salt water from sandy-lime at 4242-62 feet. The test was drilled to 5002 feet. Water is believed to be coming from above saturated zone.

The Hull-Silk multiple-pay field, Archer County, continues to command a full share of the property trades being made in the district by new entrants. Bert Ligon et al have negotiated a second sale of producing acreage to Southern Petroleum Exploration, Inc., with the latter paying $300,000 for Lots 8 and 12, Section 29, east edge of the mid-section of the field. The 80-acre property has two 3800-foot and a 4300-foot well, and Wilson 3-C, twin to the latter, flowed 80 barrels of oil in 20 minutes when tested in Strawn at 3856-63 feet. In the northeast extension area, originally termed the Sikes pool, Louis Sikes et al's Anderson 5 provides a major extension for the upper Strawn in showing for a flowing well when formation tester was used on sand at 4028-42 feet. The oil tests 43-gravity, being slightly higher than that produced by 4300-foot offset wells.

East portion of the K-M-A field and south of the river is receiving a deep test from Bridwell Oil Company's Cone 1, J. M. Sharpe Survey A-262, which was drilling at 4315 feet. Small show of oil in lime at 4051-72 feet, projected pay level, was passed up and the outpost encountered water at 4184-4207 feet. Top of lime was called at 3728 feet. J. C. Jennings Drilling Company's Will Burnett 1, BS&F, Section 1, A-378, is a northeast outpost location.

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West Texas

Wildcat logs highest known Pecos County Ellenberger

San Angelo, Texas.—High structural position recorded by an Ordovician prospect in Pecos County places it in the limelight, while an equally interesting deep test in Crockett County prepared to plug back after testing a small show of gas with sulphur water in the lower Ordovician.

Olson Drilling Company and Bryce McCandless' Crockett 1, SE T. C. Ry. Section 5, Block 110, 2½ miles south by west of deep production in the Apco 3-well pool, recorded the highest known Ellenberger top in Pecos County in logging this marker at 4405 feet with an elevation of 2461 feet. No shows were reported in drilling to 4416 feet, where operations were halted to start coring. Crockett 1 passed up nominal saturation in basal Permian at 4361-69 feet and failed to encounter the Simpson section, which is also absent in the Apco pool. It is 223 feet higher on structure, based on the Ellenberger correlation, than the nearest deep producer.

Continental Oil Company et al's Todd 1, third Ordovician test for Crockett County's most promising deep structure, yielded a small volume of gas with sulphur water after using 3000 gallons of acid in the lower section of the Ellenberger, at 6356-7010 feet. The hole is to be plugged back to 6785 feet to use acid in an oil saturated zone indicated by an electrical logging tool at 6713-67 feet. Should this horizon fail to produce, the test will be plugged back to reacidize near the Simpson-Ellenberger contact. Participants in this unit development have agreed to start another deep test on their 4480-acre block shortly after the first of the year. In the meantime they are forestalling lease expirations with shallow gas development.

Expansion of the Foster field, Ector County, ½ mile to the northeast and into doubtful territory was assured by the appearance of 3500 feet of oil in hole for Continental Oil Company's Johnson 1-B, SE SW NE T&P Section 5, Block 42, after drilling to 4231 feet. York & Harper and Sloan-Zook Company's Foster 1-D, SW NW NE Section 8, ¾ mile south, missed the regular pay in drilling to water at 4637-4700 feet, but is due to run 5¼-inch pipe to continue to the Holt oil zone.

Landreth Production Corporation and Shell Oil Company's Johnson 1-B, wildcat on a strike midway between the Foster-Johnson and Goldsmith, bailed a small amount of oil after standing at 4310 feet. It will be deepened, but did not encounter the anticipated structural relief in logging top of brown lime at 3850 feet with an elevation of 3046 feet.

Richmond Drilling Company-Rhodes & Tompkins' T. P. Land Trust-Amerada 1, SW SE T&P Section 19, Block 42, 1¾ miles southeast of production in North Cowden field, provided a surprise in checking high in drilling to 3550 feet. Top of Yates was called at 2850 feet, or 182 feet above sea level, being 34 feet higher than the nearest producer.

An extension for the east edge of North Cowden will be sought by Western & Southern Oil Company, which is rigging up for R. W. Smith 1, NWc T&P Section 6, Block 42, T-1-S. If the 240-acre lease is productive, the company is obligated to drill 6 wells.

Resumption of drilling on Phillips Petroleum Company and Pure Oil Company's Clyde and Jessie Cowden 5178-acre lease, embracing the southeast portion of Goldsmith field, involves 6 immediate tests. Contracts were awarded to Loffland Brothers and Kerlyn Drilling Company for a total of 60 tests, which are needed to bring the well density down from 35 acres to 20 acres per well on the 6 sections that are on production. Phillips Petroleum Company acquired ½ interest in the acreage from Pure Oil Company early in 1935 and finances the development with the latter receiving ⅛ overriding royalty until the property is paid out. Then it becomes a 50-50 working interest.

Extension Indicated

Half mile southeast extension for the Sharon pool, Scurry County, was indicated when Petroleum Producers Company et al's Sterling-Magnolia 1, NE NW NW H&TC Section 123, tested ¼ bailer oil per hour from upper pay at 2297-2325 feet.

Typical grass root production for Pecos County has been uncovered by O. E. Schkade et al's Lehman 1, near NE NW SW H&GN Section 107, Block 8, from sand at 43-59 feet. The fluid resembles processed petroleum grease, and was passed up by H. L. Crain et al's Lehman 1, a wildcat. Schkade et al paid a cash bonus for the mineral rights down to the 150-foot level on the 160-acre tract.

The third oil producer for Cedar Lake pool, northeastern Gaines County, was in process of completion late last week. Stanolind Oil & Gas Company's Green 1, south offset to its discovery, swabbed 85 barrels of oil in 8 hours from broken pay at 4609-4760 feet while conditioning the hole for a nitro shot. The company's Riley 1, 3½-mile northwest outpost, tested dry after cleaning out cement to 4864 feet, total depth, and also will be given a nitro shot.

Lynn County has been assigned a shallow wildcat test to be drilled by Guthrie Lake Oil Company's Shoe 1, near SW NE NW, E. L. Ry. Section 20, Block 8. A pending deep test for the county may materialize early next year as R H. Gill et al have been successful in selling lease spreads from their 18-section block that was farmed out by Honolulu Oil Corporation for a Permian test, tentatively scheduled for NE BS&F Section 259, Block L.

Stonewall and Haskell County wildcats show

Abilene, Texas.—An oil strike on a core-drilled structure in south central Stonewall County was in prospect the past week, and deep core tests on a previously drilled block in Haskell County have revealed sufficient oil and gas shows to indicate commercial production is available.

Stonewall County's prospect commanded attention when Shell Oil Company's T. K. Smith 1, NW NW SW H&TC Section 143, Block 1, 8 miles south by east of Aspermont, bailed at rate of 3 barrels of 36-gravity oil per hour from saturated lime at 4395-97 feet, with an elevation of 1767 feet. Production test will be deferred pending the landing of 7-inch pipe to cut off water from above. Location for this wildcat followed the drilling of a number of 800- and 1000-foot core tests, which were checked with an electrical logging tool. Smith 1 is 1½ miles northwest of General Crude Oil Company's Harrison 1, which had a show of oil at 3594-99 feet, with an elevation of 1728 feet, and quit in salt water at 3675-80 feet in November, 1937. Stonewall County has 2 single-well pools. In the Carlisle area, W. I. Southern, Incorporated's Carlisle 2, 1800 feet northwest of the discovery, failed to make a commercial producer in the 5100-foot Palo Pinto zone, and is drilling at 5980 feet to test the Ellenberger.

Prospecting will be resumed in 1940 on Amerada Petroleum Corporation's Haskell County block centering 7 miles east of Haskell, on the strength of information derived from core tests. This company's C. C. Rose 1, near southeast corner of 393-acre tract, J. M. Cass Survey No. 57, experienced gas blowouts at 1020 feet and 2417 feet while making a large-hole core test, and quit in oil saturated lime at 2918-33 feet. The latter is 1 mile south of the company's C. J. Kleiner 1, which was abandoned last May in Ellenberger at 5485-5607 feet, having failed to encounter any promising shows.

Plymouth Oil Company's McClure 1, SW NE NW T&P Section 49, Block 23, projected 8000-foot or Ellenberger test on a large wildcat block in Nolan County, yielded sulphur water when formation tester was used at 7105-37 feet. It is credited with having reached the Ellenberger near the 6967-foot level, with an elevation of 2396 feet, and was drilling at 7220 feet.

Texas permits for week total 269

Permits for drilling 269 new wells in Texas were approved by the Texas Railroad Commission last week, 26 more than were allowed the week before.

Operators in the East Texas field reported three permits, including two in Rusk and one in Gregg County, while six locations were approved in the remainder of the East Central Texas area.

There were 59 permits in West Texas, including 24 in Ector and 21 in Yoakum County. Producers in West Central Texas listed 23 locations.

North Texas held first place in the state with 66 permits, 23 of which were in Archer County, and 20 locations were approved in the Panhandle.

From the Gulf Coast section 32 locations were listed, with 12 in Harris County, while operators in Southwest Texas were allowed to drill 60 new wells.

1940 wildcatting to exceed this year's in South Texas

San Antonio, Texas.—The close of the year in South Texas has brought one of the most intensive wildcatting programs in more than 12 months. It is an indication that 1940 work will far exceed that of 1939 in the unproved areas. Of particular importance is the fact that this work, currently involving 91 wildcats, is completely scattered through the district.

A check-up at the close of the last

week showed the general San Antonio Cretaceous trend to have 21 wildcats in the active or temporarily shut-down stage. The Pettus region reported 8, while the Mirando zone was being explored by 25 wells. There were 13 wildcats drilling in the Rio Grande Valley sector and 24 in the Corpus Christi trend.

Texas Panhandle

Panhandle area discovery responds to deepening

Pampa, Texas. — The discovery oil well of the Texas Panhandle has responded to deepening and workover operations after nearly 19 years to establish a potential of 331 barrels of 39.4-gravity oil on pumping gauge from granite wash at 3097 feet. The strike was made by Gulf Oil Corporation's S. B. Burnett 2, SE NW I&GN Section 106, Block 5, Carson County, late in 1920 from pay at 3045-48 feet after negotiating what was then termed the troublesome gas zones in the upper lime. It was rated at 175 barrels initial when placed on production in April, 1921, but had settled to 2 barrels daily when worked over. Total oil production for this pioneer oil well in the district passed the 126,000-barrel level this month.

East Texas

Chapel Hill outpost has fair porosity in Second Glenrose

Tyler, Texas. — Penetration of the second Glenrose zone by Shell Oil Company's Campbell 1, northeast outpost for the Chapel Hill gas-distillate pool, eastern Smith County, revealed fair porosity with odor of oil in cores at 7571-99 feet. It will be deepened and tested at intervals. Top of the lower Glenrose was logged at 7370 feet, with an elevation of 449 feet for a 136-foot lower structural position than the discovery, which is bottomed at 7528 feet, or 283 feet in this particular geological section.

A new depth record for the Woodbine belt will be attained if Shell Oil Company elects to continue to the lower Trinity series in drilling Dorsey 1, first deep test for the Percilla pool, northeastern Houston County. It had progressed beyond the 9100-foot level late last week with the anhydrite sections ahead. No shows have been recorded since formation tester used in upper Glenrose at 8541-76 feet yielded 36-gravity oil with drilling fluid.

Another lower Trinity test for the Barron gas pool, Limestone County, has been started by Murray Samuell and Zephyr Oil Company, joint owners of a large acreage block along the fault zone. They have been given a permanent market for the gas production by Lone Star Gas Company. The second project is on the Barron discovery tract situated ½ mile north by east of the producer, W. G. McKenzie Survey, 4 miles southwest of Groesbeck.

Southwest Texas

West-Vanderbilt third sand gets 14,000-foot extension

Corpus Christi, Texas.—New sand discoveries and major extensions to fields of Jackson, Victoria, Nueces and Jim Wells counties forecast a further spurt in drilling immediately after the new year. These discoveries materially aid the 1939 reserve figures in the South Texas Gulf Coastal trend.

Probably the most outstanding strike was George J. Greer's J. Ward Estate 3, on the east side of the West-Vanderbilt district in Jackson County. It encountered the third and deepest pay of the field at 5725-52 feet and on drill-stem test 5725-60 feet recovered 3100 feet of pipe line oil, 170 feet of salt water and developed 70 pounds pressure in 20 minutes through ¼- and ⅜-inch chokes. Casing was landed on bottom and perforations made in the first 10 feet of the formation for completion. No gauge was available as the week closed, but it is believed that the salt water encroachment was cut off.

The test is 14,000 feet southeast of Lonnie Glasscock's Drummond 10, only other producer in the same sand. It was completed several days ago to open the horizon. The new extension well is a direct offset to Greer's Ward 2 (1), completed several days ago to extend the 5500-foot pay to the east. The same 5700-foot sand was tested, showing oil and salt water. The completion of a producer at the lower level indicates that this will be a blanket sand for the area and will cover much of the large structure.

In Victoria County, the Catahoula trend gained further impetus with oil being discovered in a gas sand and two new Frio sands being established.

Outpost Shows

Trinity Drillers, Inc.'s Moeller 1, 2000 feet southeast of the discovery gas producer in the Victoria field and on a Shell Oil Company farmout, cored gas sand at 2548-51 feet and oil sand to 2555½ feet. This corresponds to the discovery pay. A drill-stem test at 2526-55½ feet recovered no fluid but developed 1050 pounds pressure in 3½ minutes. A second test of the last 4½ feet of the hole recovered 1400 feet of 19.9-gravity oil, little pressure and a good gas blow in 15 minutes. Pipe was set on bottom and perforated for completion. It was not ready to be gauged as the week closed.

About 4000 feet northwest of the same field, W. Stewart Boyle's Meyer 1 cored a new sand at 4776-88 feet and on a drill-stem test 4776-81 feet recovered 270 feet of 26.6-gravity oil under 15 pounds pressure in 30 minutes. The well had the regular field sand showing gas at 2500-71 feet, then cored a dry sand at 2928-54 feet. These sands are in the Catahoula, while the 4700-foot level is in the Frio.

Finds New Pay

Several miles southwest and in Cologne field, another Catahoula - Frio area, Houston Oil Company of Texas uncovered a new oil sand. Dietzel 1, 2823 feet south of the discovery, was perforated at 4692-99 feet and flowed a large amount of gas, spraying 55 barrels of 47-gravity oil per day through ⅛-inch choke. Shut-in pressure was equalized at 1810 pounds. The test originally had been drilled to 5171 feet and was plugged back to 4826-32½ feet. It was completed here nearly 2 months ago as a gas well spraying oil, then went to oil, following which it flowed almost solid salt water, resulting in the reworking job and discovery of the new pay.

A potential test on Wellington Oil Company of Delaware and Pan American Production Corporation's new sand discovery east of Clara Driscoll field in Nueces County rates the well at 113 barrels of 25-gravity crude per day on pump. The test, Clara Driscoll 1-B, is 3000 feet east of the present field. It was carried to 8194 feet, plugged back, and 12 perforations made in the Frio at 5290-5302 feet.

Magnolia City, after showing for a probable one-well area, came back into prominence with a new sand discovery and now gives promise of being one of the more important pools of Jim Wells County. Myer & Simons' Reynolds and Richardson 1, 1600 feet northwest of the discovery, cored the field sand at 5437-39 feet, but drilled ahead to 5714 feet, 10 feet in sand. Casing was set on bottom and the test completed through perforations at 5705-9 feet. It flowed 259 barrels of 45-gravity crude per day through 7/32-inch choke under pressures of 750 pounds on tubing and 1050 pounds on casing. Gas/oil ratio was calculated at 1500 to 1.

Three Sparta-Wilcox tests planned for Bee County

San Antonio.—More Sparta-Wilcox operations for the South Texas trend are in prospect. Three are expected to be drilled in Bee County, while a fourth is contemplated in Victoria County. In the meantime, it is considered possible that two holes junked in the same formation will have replacement holes.

In the Garwood sector of Colorado County, Davis and Company's McLane 1-A, is coring at about 10,000 feet, having found a series of thin sands with oil showing during the last several feet of hole believed to be in the Wilcox.

The Texas Company is reportedly working out a deal for another 9200-foot Wilcox test in the Fordtran area of Victoria County where a recently drilled test showed oil in that formation.

In Bee County, leases have been placed of record from Laura Weiss to Ralph Ogden and Hewit and Dougherty for a new 8600-foot test to be drilled north of Normanna. C. B. Bunte is reported to have practically financed a 9500-foot test to be drilled near Skidmore, while Texas Gulf Producing Company is refinancing its operation on the Culpepper lease just west of Beeville, the intention being to go to 9000 feet to test the Wilcox.

At West Tuleta, also Bee County, Mills Bennett and Anderson & Prichard have perforated at 4467-72 feet in

Robinson 1 to test the Yegua formation. It tried to blow out from the Wilcox at 7921 feet, then plugged back and sidetracked stuck drill stem, testing the higher zone.

Stuck drill stem at 8959 feet prevented completion of a test of the Wilcox formation in the Tide Water Associated Oil Company's Bruni 7, on the Bruni structure in Webb County. It made a squeeze job at 6110 feet. Plans are to perforate in the 5600-foot Queen City sand, expected to make a distillate producer. This would be a new sand for the field.

Green prospect pays off with dry gas producer

Beeville. — Green, Karnes County prospect and the center of a spasmodic exploratory campaign for more than 10 years, finally was converted into a producer through completion of Clyde Echols' J. M. Newberry 1. The well was flowing dry gas with a petroleum odor through ⅛-inch choke under pressures of 465 pounds on tubing and 555 pounds on casing after the pipe had been perforated at 2942-47 feet. This is in the Pettus sand, which was logged at 2940-52 feet.

On two drill stem tests oily mud was recovered, indicating that the well would make an oil producer. Laboratory tests, likewise, showed 8 percent saturation. As a result, it is possible that the well will be reworked in an effort to bring about crude production.

The test is about 1100 feet north of the old Fort Bend Oil Company's Newberry wildcat, which showed oil and gas. It is in the Carlos Martinez Survey, about 4 miles southeast of Green.

Strike near Hoffman may develop new trend play

Laredo—Mirando District had another shallow trend in the process of development as a result of a new field discovery in Duval County either in the base of the Frio or top of the Vicksburg formation. It gives rise to a possible new play through this zone directed to a pinch-out or sand lensing along a shore line.

The discovery was by Cox & Hamon and Gorman-Yoakum on the Gorman-Hoffman lease in the south corner of Section 119, 2 miles east of the Hoffman pool. The test had been carried to 3309 feet, testing the usual Mirando sand series, then plugged back to 2250 feet, casing being set at that level. Perforations were made at 2014-35 feet, from whence the well flowed at the rate of 300 barrels of 21.3 gravity oil per day through ⅜-inch choke,—no tubing, 100 pounds casing pressure. The field has been named Tarancahuas after a nearby creek.

The above discovery, on an 880-acre block, is probably the first production in this zone thus far found in the Mirando trend. There are several Frio sand producers at 1400-1500 feet in the southern portion of the Seven Sisters field, 15 miles north. Plymouth Oil Company and Sun Oil Company, both holding acreage in the general vicinity, are expected to explore the trend. Gorman-Yoakam, drilling contractors, sunk the well on a contract and interest basis.

Long horn field, also in Duval County, was defined to the southeast as Hiawatha Oil & Gas Company's Denman 5, Santos Flores Grant, was abandoned at 6011 feet after testing salt water.

To start Edwards lime test in Bexar County

San Antonio, Texas.—A new 4000-foot Edwards limestone wildcat is being commenced in the extreme southern portion of Bexar County. Subject to bottom hole spreads purchased by H. H. Weinert, Wilcox Oil & Gas Company and Magnolia Petroleum Company, a contract has been awarded by Beauchamp and Wilson for J. J. Brown 1. It will be near the center of a 58.6-acre tract in the Shields Survey No. 19¾.

In the Friotown area of Frio County, where one well showed some oil on a production test of the Austin chalk, a new failure has been recorded. Topping the Edwards limestone below 3,000 feet, Pagenkopf and Jamieson's Houston Estate 2, about 2,000 feet northeast of the first well, has quit drilling.

Texas Atlas Oil Company's Cory & Williams 1, first of a series of tests for Pearsall field, Frio County, was waiting on cement after setting a string of casing to 5425 feet. It topped the chalk at 5410 feet and drilled 15 feet of the formation.

Pumping at the rate of 3 to 5 barrels of oil per day, Wilson et al have opened a new producing spot in the extreme southwestern portion of Guadalupe County near the Bexar County line. The pool, probably to be known as Lavernia, is near the several shallow wells on the New Berlin prospect. The area was uncovered by Lentz 1, U. Micheli Survey No. 52. It cored sand and sandy shale at 704-28 feet and is finished on pump.

Texas Gulf Coast

New sand extends Anchor 6000 feet northeast

Houston.—A new oil sand was discovered 6000 feet northeast of the discovery well at Anchor, Brazoria County, December 22, when Humble Oil & Refining Company's Mettler 1 came in flowing 6 barrels of fluid per hour through ¼-inch choke with a tubing pressure of 2800 pounds. The oil, still flowing into burning pits, tested 38.4 gravity. Mettler 1 was perforated with 15 shots from 10,578 to 10,585 feet, or about 100 feet deeper than the discovery well. It was drilled to 10,617 feet and 7-inch casing was set at 10,607 feet. About 2500 feet southeast of the discovery well Humble made location for R. H. Carr 1, J. Valderas Survey.

Northwest of the discovery well at Anchor, 220 feet, Glenn H. McCarthy's Salmon 1, Geo. Robinson Survey, was perforated at 10,495 to 10,502 feet with 48 shots and was flowing into burning pits making gas and wash water through ¼-inch choke. Salmon 1 was drilled to 10,756 feet in broken sand and 5½-inch casing was set at 10,630 feet. The first test on the outpost, from 10,540 to 10,542 feet, showed water.

In the Chocolate Bayou area, Brazoria County, McCarthy's Houston Farms Development Company 2, Perry & Austin Survey, was drilling in shale near 10,000 feet, below the 9865-foot sand found in the discovery well.

Gulf Oil Corporation was preparing to core deeper in R. Brown 1, Juliff area, Wm. Pettus Survey, Fort Bend County. This wildcat was drilled to 8380 feet and it tried to blow out when a sand was logged in Vicksburg formation. The hole has been cleaned out and 7-inch casing set at 8353 feet.

In the Sandy Point area, Brazoria County, Frazier & Mayo's Darrington State Prison Farms 1, was coring in shale at 8562 feet after coring a sand with a gas odor at 8267-80 feet. The operators will explore deeper into the Vicksburg where Hamman Exploration Company's State 1 showed some oil several months ago.

In the Rosenberg area, Fort Bend County, Magnolia Petroleum Company was reaming hole at 8698 feet after trying to run a short string of liner to bottom. The company plans to make a test of a gas and distillate sand logged at 8656 feet. The hole is bottomed at 8698 feet and 7-inch casing is set at 8550 feet. This wildcat also had a show of gas and distillate at 8259 to 8264 feet.

A half mile north of Collegeport shallow gas field, McDannald Oil Company's Shell 1, D. C. Arthur Survey, has been completed making 2,393,000 cubic feet of gas daily through ¼-inch choke with a tubing pressure of 1550 pounds. The well was perforated at 4090 to 4100 feet with 23 holes. It is bottomed at 5803 feet. McDannald recently completed Woodhouse 1 at 3760 feet for a gas well.

Reports that David B. MacDaniel's Baldwin 1, Tamina area, Walker County School Land Survey, Montgomery County, had logged oil sands in the Wilcox formation, could not be confirmed. Baldwin 1 was down to 8940 feet, fishing for 2000 feet of drill pipe lost in the hole.

On the northeast side of Martha field, Liberty County, Pan American Production Company's Hutcheson 1, B. Pruitt Survey, was abandoned last week at 8972 feet in shale. The sand was not thick enough to make a commercial producer.

Another wildcat failure was reported on the Galveston Island prospect, Galveston County, last week when Hebert & Smith's Harris 1, Halls & Jones Survey, was abandoned at 6706 feet. No sands with oil shows were cored.

In the Smithers Lake area, Fort Bend County, Superior Oil Corporation's A. P. George 1, W. Martin Survey, was abandoned last week after failing to find any sands in the Vicksburg formation. The hole was bottomed at 8010 feet in shale. Salt water sands were cored at 6141 to 6146 feet.

The second well to encounter the deep sand at Clam Lake, Jefferson County, is Shell Oil Company's McFaddin 8. It had oil sands at 5815 to 5949 feet. The hole is bottomed at 6055 feet with 5½-inch casing set at 5962 feet. A production test will be made the coming week.

On the northwest side of League City, Galveston County, Phillips Petroleum Company is swabbing Wimhurst 1, at 10,961 feet after perforating casing. The well is failing to show anything of importance.

Louisiana Gulf Coast

Possible field indicated on Bayou Pigeon prospect

Lake Charles. — On Bayou Pigeon prospect, Iberia Parish, Plymouth Oil Company's McHugh Heirs 1, Section 13-12s-10e, cored oil sand at 7267 to 7285 feet and a 10-minute drill-stem test showed 2 stands of 30.9-gravity oil, 5 stands of salt water and 8 stands of oil and mud. It was believed the company did not get a representative test of the sand. The hole was cored ahead and another oil sand was cored at 7512 to 7518 feet, followed by salt water sand at 7518 to 7520 feet. At the end of the week the crew was coring in sandy shale at 7528 feet.

Plymouth Oil Company is drilling McHugh Heirs 1 on a block of acreage farmed out by Shell Oil Company, which worked the area with reflection seismograph in 1936. Amerada Petroleum Corporation also has acreage in the area.

Another sand was found at West Lake Verrett field, St. Martin Parish, last week by Shell Oil Company's Jeanerette Lumber Company 4. A 10-minutes drill-stem test made at 7447-53 feet through ¼-inch chokes recovered 22 feet of distillate and an 875-pound pressure. Another drill-stem test at 7463-72 feet recovered 810 feet of 37.7-gravity oil in 10 minutes through ¼-inch chokes. No water was shown; pressure was 100 pounds. When the crew pulled the drill stem the well started blowing some oil. At the end of the week the company was coring ahead at 7745 feet after logging a sand and shale formation with a slight show of oil at 7686 to 7689 feet. West Lake Verrett is already producing from Oligocene sand at 8017 feet.

Section 28 Dome in St. Martin Parish, may be productive if unconfirmed reports that William Helis' Rycade 1, flank test, logged 30 feet of oil sand between 8200 and 8300 feet are correct. The hole was down to 8899 feet in shale and sand with the drill pipe stuck. Several tests have been drilled around the salt plug, but no production has been established.

Tide Water Associated Oil Company ran a third electrical log in Delta Farms 1, Delta Farms area, Lafourche Parish, last week. The hole is bottomed at 11,844 feet. The first log showed oil sands above 10,000 feet, and the second log showed oil sands below the 10,000-foot mark. It is believed the company will core deeper.

Stanolind Oil & Gas Company is reported to have purchased Louisiana Land & Exploration Company's ½ interest at Bayou Des Allemands, St. Charles Parish. The consideration was reported at $200,000 cash and 1/16 overriding royalty.

At Ville Platte, Evangeline Parish, Continental Oil Company has 3 wells headed for the Wilcox formation. Fontenot 2 was drilling in shale at 9572 feet, H. Haas 4 was in shale and lime at 9810 feet, and W. L. Tate 2 was drilling in shale at 9793 feet. All passed up the Tate and Haas sands in the Sparta formation.

On the west side of Eola, Avoyelles Parish, Amerada Petroleum Corporation completed Dent 1 after perforating casing at 8540 to 8563 feet. It flowed 625 barrels of pipe line oil daily through ¼-inch choke, with a tubing pressure of 2350 pounds and a casing pressure of 3150 pounds. Also on the west side of the field, Kennedy et al's Irion 1 made a potential test at 8500 feet and showed for 757 barrels daily through ¼-inch choke.

A new producing horizon was discovered at North Crowley, Acadia Parish, last week by Humble Oil & Refining Company's Thevis 2 after casing was perforated with 11 shots at 8776 to 8782 feet. The well flowed 803 barrels of pipe line oil daily through ¼-inch choke with a tubing pressure of 1400 pounds. It was drilled to 8810 feet and 7-inch casing was set at 8807 feet.

The California Company has abandoned another wildcat in Beauregard Parish. Long Bell Lumber Company 2 was plugged at 10,711 feet after running an electrical log. No shows were reported. The test had a good sand section around 10,300 feet.

Louisiana permits

Forty-three drilling permits were issued last week by the Louisiana Conservation Commission of which 13 were in North Louisiana divided among the following parishes: Bossier, 1; Caddo, 9; La Salle, 2; and Sabine, 1. The 30 in South Louisiana were in the following parishes: Avoyelles, 2; Beauregard, 1; Cameron, 2; East Baton Rouge, 2; Evangeline, 3; Iberia, 3; Jefferson, 3; LaFourche, 10; St. Charles, 1; St. Mary, 2; and Terrebonne, 1.

North Louisiana

Lisbon flank test gets flow of gas and distillate

Shreveport, La.—Lisbon Exploration Company's Roberta Vaughan 1, NW NE 36-21n-5w, Lisbon field, Claiborne Parish, gauged 61 barrels of 54.8-gravity distillate and five million cubic feet of gas daily through 5/16-inch tubing choke with tubing pressure 1250 pounds and casing pressure 2800 pounds. Total depth is 8901 feet but production is from perforations at 8844-54 feet.

Should nothing but gas/distillate production be found at Lisbon, it was shown that it opened possibilities for extracting the distillate from the gas and utilizing the residue gas to re-pressure the Pettet lime at 5300 feet where nearly 250 oil wells have been completed at Lisbon, these having dropped sharply in production and a number have been abandoned due to low yield.

A half-mile south extension of the Pettet lime gas/distillate producing part of the Sligo field, Bossier Parish, appeared likely last week as Union Producing Company's S. L. Herold A-1, NW SE 29-17n-11w, showed and was running final casing to 5335 feet.

Southwest of shallow production at Con-

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verse, Sabine Parish, Noyes B. Livingston's Bowman-Hicks 1, Section 36-9n-14w, was running electrical log to bottom at 3450 feet after killing a gas flow at 3421 feet in the Paluxy.

Standard Oil Company of Louisiana having completed unitizing of a wildcat block in Bienville Parish into 160-acre units farmed out the lease to Harry Hanbury for a test to be drilled 700-feet below top of Travis Peak and location was made for Holsun Unit 1, NEc SW NE 29-18n-6w. Arkansas Fuel Oil Company is paying renewals on a block of wildcat acreage it has centering around Section 30-12n-15w, DeSoto Parish. Barnsdall Oil Company has a seismic reflection unit working in Madison Parish, near the Mississippi River and The Texas Company has a geophysical unit in Ouachita Parish.

Arkansas

Big Creek wildcat shows salt water on test

El Dorado, Ark.—Standard Oil Company of Louisiana's Petty Stave Company 1, SE SE 4-17-21, Columbia County geophysical wildcat prospect at Big Creek, which had been hailed as a possible opener of a new Smackover lime oil field, showed salt water when tested last week at 7999 feet, with casing set 10 feet off bottom, and was plugged back to 7956 feet and was testing again late in the week.

On the other hand, what had been regarded as the first failure for the Atlanta field, Columbia County, also a Smackover lime oil field, turned out to be the field's fifth oil well in Hunt Oil Company's H. A. McWilliams 1, C NW NW 15-18-19, which had an initial of 500 barrels daily from only 2 feet of saturated lime, at 8238 feet. Joe K. Mahoney and associates' Emma Riley 1, NW NE 14-18-19, drilled and cored ahead after topping Smackover lime at 8184 feet and topping porosity at 8156 feet.

Standard Oil Company's Johnson B-1, NE NE 9-16-22, in the east extension of the Buckner field, Columbia County, showed salt water at 7335 feet and plugged back.

The second oil well for the Experiment (Dorcheat) field, Columbia County, appeared likely in Lion Oil Refining Company's Warnock 1, C NW NW 15-18-22, which was showing oil while testing at 9020 feet. Approximately 75 feet of potentially productive formation was logged after porosity was topped at 8800 feet.

W. C. O'Farrell may deepen for possible Smackover lime penetration, Texas-Canadian Oil Company's Stocks 1, Section 9-15s-22w, Nevada County, completed several years ago as a small producer in the Nacatosh, in wildcat territory.

Arkansas permits

Two drilling permits were issued last week by the Arkansas Oil and Gas Commission, as follows: Columbia County—Normandie Oil Company, H. E. King 1, C NE NE 20-17-20; Lafayette County—East Texas Refining Company and Erwin and Leach, Eliza P. Davis, C N½ NW NE 19-16-23.

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Eighth Tinsley Dome well looms with 18 feet of pay

Jackson, Miss.—The eighth oil well for Tinsley Dome, Yazoo County, loomed last week as final casing was set in Union Producing Company's G. C. Woodruff 3, C SE NW 13-10n-3w. With elevation of 266 feet, this test topped Selma chalk oil saturation at 4570 feet and logged 18 feet of saturation; total depth is 4596 feet and top of chalk 4454 feet.

Four miles northwest of production, T. B. Slick's Atkinson 1, NE SW 3-10n-3w, was abandoned at 5043 feet in igneous material, with no showing in either Selma chalk or Eutaw.

In Issaquena County, W. E. Hall of Shreveport is moving in for Irby Charping 1, C NE NW 29-10n-8w. In Jefferson Davis County, Fred E. Courson and associates are rigging rotary for L. J. Bailey 1, SW SW 4-6n-18w, for a 4000-foot test. Rowan and Hope of San Antonio have contract. On a block of 16,000 acres in Warren County, Burden and Cummongs are rigging for T. M. Morrissey 1, NE NE 8-17n-2e.

Sixty-three geophysical units are working in the state.

J. P. Evans has secured approximately 15,000 acres in Oktibbeha County near Starkville, mainly in township 9, range 16 east. This operator has 7000 acres in Attala County; 10,000 acres in Winston County; 15,000 acres in Neshoba County; and 10,000 acres in Kemper County.

In Bolivar County, Ed Holman of Gladewater, Texas, has taken 11,000 acres for immediate drilling in township 24 north, ranges 7 and 8 west. In Carroll County, M. L. Boykin of Vaiden has 18,500 acres around Section 4-17n-4e. In Calhoun County, Exchange Petroleum Company (Sinclair Prairie) has taken 11,000 acres centering around Section 32-11n-1e and in Chickasaw County Carter Oil Company is assembling a block in township 14 south, ranges 4 and 5 east.

Magnolia Petroleum Company is taking scattered leases in townships 2, 3 and 4 north, ranges 17 and 18 east, Clarke County. In Clay County, R. M. Shaw took 3000 acres in townships 15 and 16 south, ranges 3 and 4 east. J. A. Burnhan has a block in the same townships and ranges and in parts of Clay, Lowndes and Monroe counties, J. A. Cobb has secured 13,000 acres. J. S. Wheless, Jr., of Houston, and G. L. Kemp are blocking in Copiah County in township 1 north, range 3 west. J. L. Duncan of Fort Worth has secured 30,000 acres in townships 3 and 4 south, ranges 8 and 9 west, DeSoto and Tate counties, extreme north Mississippi.

In Humphreys County, W. B. Osborne has taken 3500 acres in townships 15 and 16 north, ranges 3, 4 and 5 west and E. P. Wingfield has a 7500-acre block centering around Section 20-15n-4w.

In Ittawamba County, northeast Mississippi, J. B. Yarborough leased 10,000 acres for Magnolia Petroleum Company in townships 8, 9, 10 and 11 north, ranges 7, 8 and 9 east and the

same man assigned Magnolia 3000 acres in township 4 north, ranges 10, 11 and 12 east, Jasper County. Yarborough is also leasing in townships 11 and 12, ranges 7 and 8 east, Monroe County. In Newton County, A. Lippa has 5000 acres in escrow centering around Section 12-18n-10e, for a test to spud by January 3, 1940. In the same county, J. Mack Smith and associates have 13,000 acres centering around Section 35-8n-12e and T. W. Brand, Jr., has 12,500 acres around Section 15-6n-13e.

In Neshoba County, J. C. Turner, Jr., and I. B. Laughlin leased 8000 acres around Section 2-9n-11w. R. Reid has 30,000 acres in township 23 north, range 1 east, Tallatchie County, and O. A. Keith and associates secured 4000 acres in townships 23 and 24 north, ranges 6 and 7 east, Yalabousha County.

Rocky Mountain States

North Geary wildcat retests in race with permit expiration

Casper, Wyo.—Continental Oil Company is testing production from the Third Wall Creek sand in its North Geary Dome wildcat, Natrona County, Wyoming. McGrath - Government 1, CNW SW 15-34n-78w, was perforated opposite saturation at 5630-40 feet, 15 holes, and 5660-80 feet, 25 holes. On a previous test through perforations of the same number at the same depths the well showed some free oil and gas with mud. Mud apparently was coming through perforations from behind the production string, and the well was recemented and reperforated. The company is bending every effort to complete before December 31, in order to validate unitized federal permit lands to old form federal leases carrying a 5 percent royalty to the government on one quarter of permit acreage, designated as preferential acreage and embracing 640 acres in a full permit. Total depth is 7331 feet in the red beds. After testing the upper horizons plans are to drill to Tensleep. In the event of production in the lower sand, expected at 8800 feet, deep testing would be stimulated in the Midway and Cole Creek fields, and in Geary Dome (proper), none of which have been drilled to the Permian-Pennsylvanian system.

Another dead line wildcat and one which will apparently make discovery is Dr. F. F. Hintze's Government-Jones 1, NW NW 7-28n-92w, which drilled into gas flow in the First Frontier formation, upwards of 3,000,000 cubic feet daily. The test is drilling to validate a group of unitized federal permit lands on the Spring Creek structure, Fremont County. It had the top of the First Frontier at 485 feet and gas saturation to 545 feet. It was drilling at 600 feet headed for the Second Frontier when it dropped tools and is tied up with a fishing job.

However, whether or not the fishing job is cleaned up prior to December 31, it is believed the gas flow is strong enough to make valid claim for receiving departmental sanction of lease from permits.

Michigan

Two fields extended and third has promising indication

Mt. Pleasant, Mich.—Half-mile extensions to two Michigan fields were drilled during the week, an extension to a third pool appeared likely, and a wildcat in Ottawa County drilled 3,000,000 feet of gas in the Berea sand. It was one of the best week's in 2 months from the standpoint of opening new locations and for the first time in several months operators in the Basin were talking enthusiastically about the future.

Wicklund Development Company's Haley 1, NW SW NW 16-16n-3w, Wise Township, Isabella County, filled up 950 feet in 5-3/16-inch casing at 3712 feet and was to be acidized with 1500 gallons immediately. Haley 1 is a full half mile north of production in the field. Dundee top was logged at 3654 feet.

In Southeastern Michigan, A. V. Oil & Gas Company extended the Dundee-Monroe County pool a full half mile south with the Duval 1, SW NE NW 31-6s-6e, which flowed 190 barrels in 13 hours from Trenton limestone at 2110 feet. It was the first commercial producer to be drilled in the field outside of Dundee Township. It may prove more important to new development than the same company's Gaertner 3, Section 19-6s-6e, Dundee Township, which flowed 805 barrels natural four week ago, as the first natural high flow well in the field. Gaertner 3, which was down for 10 days when tubing sanded and paraffined up, was placed back on production Monday, flowing 290 barrels the first 24 hours.

Between the Duval extension well and the field proper are three abandoned Trenton wells, two of which were drilled during the past month.

In Ottawa County, C. C. Goff's Sims 1, NE SE NW 24-7n-13w, Tallmadge Township, three quarters of a mile north of the developed Walker-Tallmadge field, topped Traverse at 1912 feet and logged saturation at 1915 feet. A 5-inch casing string was set at 1891 feet before drilling farther in the lime. About 200 acres was added to the proven territory a week ago on the northwest side of the Walker-Tallmadge field, where the bulk of new drilling is now going on. Welsh Oil Company cleaned out Kuipper 1, SE SW SW 25-7n-13w, Tallmadge, a half mile southwest of developed production, which was originally abandoned at 1960 feet as non-commercial, and acidized it to a 25-barrel pumper.

Daily Crude Oil Company's Hambelton 1, NW NW NW 19-8n-13w, Wright Township, Ottawa County, topped Berea at 1190 feet and gauged 3,440,000 feet at 1193 to 1196 feet. Six-inch casing was set at 1213 feet and braden headed to save gas and permit drilling ahead to the Traverse lime, original objective. This test in conjunction with one drilled by Daily two months ago in Polkton Township, three miles northwest, which gauged better than a half million feet of gas at 1205 feet in Berea, appears to define a new Western Michigan gas field. It is approximately midway between the Ravenna gas field in Muskegon County to the northwest and the Walker-Tallmadge oil-gas field to the southeast.

Gentry Engineering Company's Christensen 2, SE SE 20-11n-8w, Pine Township, Montcalm County, logged Dundee at 3275 feet and shut down for orders at 3302 feet with a show of oil.

Besides A. V. Oil Company's Duval 1 extension producer in Monroe County, Brailey Oil Syndicate's Ault 1, NW SW NW 17-7s-6e, Summerfield Township, was under test after a 60-quart nitro shot in Trenton at 2035 feet. Trenton top was logged at 1957 feet with a show of oil at 2028 feet. Ault 1 is three miles south of the Duval extension.

Tamblyn Development Company's Kujawski 1, Section 21-8s-14w, Cass County, just north of the Indiana-Michigan state line, was drilling out the Dundee lime section with 200 feet of water at 790 feet. Dundee top was reported at 754 feet.

California

Eocene objective of new drilling at Kettleman

Los Angeles.—The deep Eocene zone which accounted for one of the state's greatest discoveries in years, East Coalinga Eocene pool of Fresno County, has brought about a revival of drilling in Kettleman Hills North Dome, discovered 11 years ago by Milham Exploration Company.

Union Oil Company is preparing to drill additional wells on the 160-acre King parcel, for which it is reported to have paid around $6,000,000. Eight wells were drilled into the Temblor, overlying the Eocene, one well to 20 acres, and today, Union is preparing to spot the new Eocene projects in between the Temblor zone wells.

Six miles from the Huffman and King parcels of Kettleman North Dome Standard Oil Company of California's No. 27-7Q well, which is drilling an untested portion at the top of the structure, has cemented casing at 9420 feet and a production test will be forthcomnig shortly.

Wood-Callahan Oil Company, operating in West Montebello pool, is believed to have set-up a new record in landing 7630 feet of 7-inch casing to bottom in 6 hours and 45 minutes from the time the shoe went through the rotary table until circulation was obtained with all pipe landed.

West Montebello pool last week also was the scene of 8 new producers with an aggregate potential of 3800 barrels daily.

Union Oil Company last week encountered edge water and had to plug back from 7613 to 7116 feet to complete Callender 74, a northwesterly extension of Dominguez, for 240 barrels daily. The well, brought in on a gas lift, cut 8.2 percent. R. E. Havenstrite's Larronde 1, an outpost test bottomed at 7543 feet, performed satisfactorily on test and is slated for completion.

UNITED STATES WELL COMPLETIONS

Company, Well and Location	Init. Prod. Bbls.	Depth

Arkansas

Columbia County (Atlanta)—
Hunt, McWilliams 1, 15-18-19..... 500 8239
Columbia County (Magnolia)—
Shell, Lewis 1, 19-17-19 .....1100 7609
Union County (Rainbow City)—
Frank Anthony, Jerry 1, 21-17-14. * 2692

California

Los Angeles County (Long Beach)—
Dormax Oil, Dormax 1..... 250 10,411
John McKeon, Oil Exchange 1 .. 200 3424
Richfield, City B-8..... 200 4940
Los Angeles County (Montebello-West)—
Angle Oil Co., Angle 1..... 170 7648
Fremont Oil Co., Fremont 1.....1015 7582
Fremont 2 ..... 420 7605
Golden Eagle, Golden Eagle 1.... 450 7653
Golden Eagle 2 ..... 400 7645
Herley-Kelly, de Staute 2..... 530 7620
Standard, Braun 7 ..... 101 7645
Traders Oil Co., La Merced 2..... 675 7676
Los Angeles County (Richfield)—
Union, Chapman 24 ..... 138 4852
Los Angeles County (Wilmington)—
Brookline, Donnie Comm 1..... 315 3698
Dumm Bros., Dumm (LB) 4..... 246 3475
Los Angeles Basin Dr. Co., Kupfer (LB) 3 ..... 147 3595
Kern County (Edison)—
El Tejon, Douglas 1 ..... 145 4100
Kern County (Trico)—
Trico, Tulare Farms 2..... ¶25 2470
Kern County (Coles Levee)—
Richfield, KCL B-76-4..... 419 9499
Standard, KCL 20-4 .....1020 9632
Fresno County (East Coalinga Eocene Pool)—
Robert S. Lytle, No. 26-18-F.....3110 7672
Standard, No. 75-13C 2078 7320
Kern County (Greeley)—
Standard, KCL 12-5 .....3425 11,510
Kern County (Kern River)—
Dick & Dore, No. 9 ..... 5 683
No. 11 ..... 5 535
Helm & Smith, H & S 16..... 8 678
Kern County (Midway-Sunset)—
E. H. Mitchell & Co., No. 13..... 15 855
Kern County (Mountain View-South)—
Richfield, Mott 2 ..... 871 6155
Texas Co., Mott 1.....1423 6080
Kern County (Ten Section)—
Shell, KCL A-61-25.....3032 8200
KCL B-32-28 .....2640 8220
Santa Barbara County (Santa Maria Valley)—
Navy Oil Co., O'Donnell 1.....4250 5698
Ventura County (Ventura Avenue)—
Tidewater Associated, V L & W 42.1828 9810
V L & W 44 .....2444 9700
Kern County (Mt. Poso Area)—
Vedder Pet. Co., Lambert 31-1..... * 1948
Kern County (Strand Area)— *
Continental, KCL D-2 ..... * 14,051

Illinois

Clay County—
Olsen Dr. Co., Erwin 2, c s se nw 12-2n-6e 25 3174
Pure, Moseley 5A, c se se se 4-2n-8e 106 3037
Smith 4A, c e sw nw 7-2n-8e.... 248 3057
Smith 7B, se ne se sw 7-2n-8e..... 165 3060
Bissey 2, c w nw nw 17-2n-8e... 161 3106
Orchard, Norton 4, sw sw sw, 7-2n-8e 105 3042
Norton 3, nw ne nw 18-2n-8e.... 700 3029
D. Duncan, Ranes 1, ne sw se 17-5n-5e ..... * 2338
Clinton County—
Norton & McWilliams, Athoff 1, c s ne sw 9-1n-3w..... * 1074
O. W. Burroughs, Adams 1, se sw se 12-3n-1w ..... * 1707
Edgar County—
A. M. Meyers, Schneider 1, nw sw ne 29-13n-13w ..... * 1620
Edwards County—
Anderson & Broadus, Harms 1, sw ne sw 17-1s-14w ..... * 3151
Herrick & Broadus, Broster 1, nw sw se 34-2s-14w 80 2658
Broadus et al, Broster 1, sw sw se 34-2s-14w 210 2630
Potter et al, Broster 1, sw sw nw se 34-2s-14w ..... * 2659
Fayette County—
Parrott & South, Guffey Jr. 1, ne se nw se 1-5n-2e..... 30 1632
Max Conray, Smith 1, ne ne nw 6-5n-3e 75 1637
Oil, Inc., Wade 1, nw sw ne 28-5n-4e ..... * 2511
Gulf, Small 9, c ne sw se 25-6n-2e 134 1613
Small 10, c nw sw se 25-6n-2e... 146 1614
Ohio, Swarm 3, nw ne ne 36-6n-2e.. 135 1615
Kistler 2, w nw 31-6n-3e..... 107 1613
Carter, Hopper 10, se nw sw 5-7n-3e 496 1576
Deal 7, se ne nw 6-7n-3e..... 444 1595
Hobbs 8, se se ne 6-7n-3e..... 120 1561
Hobbs 13, se nw ne 6-7n-3e..... 484 1578
Quade 6, c ne sw 6-7n-3e..... 46 1514
Welker 9, sw sw se 7-7n-3e..... 140 1577
Durbin 3, sw sw ne 8-7n-3e.... 300 1514
Owen 5, ne ne sw 8-7n-3e..... 54 1566
McCormick 7, ne nw ne 18-7n-3e 288 1573
Coddington 8, ne sw sw 20-7n-3e 402 1557
Heckert 7, ne nw sw 20-7n-3e... 450 1550
Huffman 1, sw se ne 2-8n-3e.... 318 1612
Kagay 1, sw se se 14-8n-3e..... 240 1484
Kagay 2, ne se se 14-8n-3e..... 318 1500
Eagleton 3, ne se sw 20-8n-3e... 25 1520
Eagleton 4, s se sw 20-8n-3e.... * 1593
Boles 4, nw sw sw 21-7n-3e..... 264 1554
Bauer 23-3, ne c sw nw 23-8n-3e I 1588
Mills 28-7, se nw sw 28-8n-3e.... I 1575
Union Prod. Pet. Co., Arnold 8, se nw sw 8-7n-3e 80 1560
Stewart Dr. Co., Durbin 1, nw ne sw 9-7n-3e ..... * 1576
W. B. Johnson, Logus 4, sw sw sw 18-7n-3e 85 1560
Arnold 4, ne sw nw 19-7n-3e..... 100 1564
Arnold 5, w sw nw 19-7n-3e.... 95 1573
Roby Dr. Co., Cummings 1, se nw sw 16-8n-3e 125 1572
Gallatin County—
Delta Dr. Co., Wineberger 1, w½ nw sw 31-3s-9e ..... * 2700
Hamilton County—
Alma Oil & Gas Co., Federal Chemical & Coke Co. 1, sw sw se 9-7s-6e ..... * 3389
Hancock County—
Minnie & Grady, Roberts 1, s nw sw 24-4n-5w ..... * 383
Jefferson County—
Lickey et al, Brownwood 1, se nw nw 9-1s-1e ..... * 2356
Magnolia, Stonecipher 2, ne se ne 9-1s-1e 112 2078
Wiser Oil Co., Knell 2, se sw ne 9-1s-1e 150 2070
Carter, Hall 5, sw sw ne 4-1s-2e... 221 1960
Hall 6, se se nw 4-1s-2e..... 160 1960
Hawkins 2, nw nw se 9-1s-2e... 35 1939
Lawrence County—
Sewards & McDougal, Garvey 1, se nw sw 5-2n-11w..... 7 1849
Dr. Sunderland et al, Leathers 1, nw sw sw 20-2n-11w 25 1850
Madison County—
Fred Cary, Hassel 1, se se sw 11-3n-9w ..... * 1635
Marion County—
Texas, Bryant Community 3, sw sw se 4-1n-2e 175 1871
City of Centralia 36, nw ne sw 4-1n-2e 406 1901
City of Centralia 37, se sw nw 4-1n-2e 210 1901
Farthing 10C, se ne nw 4-1n-2e.. 182 1873
Hays 6, nw ne ne 4-1n-2e..... 350 1875

Summary of Drilling Operations in the United States, Week Ending December 23, 1939

	WELLS COMPLETED							NEW WELLS STARTED*				
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1939	Total this Date 1938	This Week	Total this Month	Total 1939	Total this Date 1938	Year Total 1938
Alabama	.....	.....	.....	.....	.....	2	2	.....	.....	5	.....	.....
Arizona	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....
Arkansas	3	2	.....	1	1,600	225	230	2	14	223	247	247
California	35	33	.....	2	31,975	1,088	1,260	14	65	1,136	1,146	1,146
Colorado	.....	.....	.....	.....	.....	19	11	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....
Georgia	.....	.....	.....	.....	.....	1	1	.....	.....	4	.....	.....
Illinois*	148	116	.....	32	47,952	3,884	2,044	91	397	893*	.....	.....
Indiana	7	1	1	5	250	295	164	.....	.....	.....	.....	.....
Kansas	41	29	1	11	37,703	1,450	1,646	34	154	1,449	1,214	1,214
Kentucky	15	8	1	6	240	659	809	.....	.....	70	.....	.....
Louisiana	33	25	2	6	7,021	1,181	1,075	43	151	1,583	1,453	1,453
Michigan	32	16	1	15	3,295	1,482	1,000	20	91	1,419	953	953
Mississippi	2	.....	.....	2	.....	20	20	.....	.....	29	.....	.....
Montana	4	4	.....	.....	567	156	77	.....	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....	.....	1	1	1	1	2	.....	.....
New Mexico*	9	8	.....	1	3,003	661	545	11	53	293*	.....	.....
New York	22†	22†	.....	.....	107	669†	668†	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Ohio	12	3	6	3	3	1,005	933	.....	.....	.....	.....	.....
Oklahoma	41	22	3	16	2,534	2,071	2,091	37	181	2,059	1,978	1,978
Pennsylvania	31†	31†	.....	.....	55	1,545†	2,045†	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
Tennessee	.....	.....	.....	.....	.....	4	2	.....	.....	.....	.....	.....
Texas	239	175	6	58	96,012	9,527	12,208	269	860	10,269	12,369	12,369
Utah	.....	.....	.....	.....	.....	.....	4	1	1	3	.....	.....
West Virginia	16	4	9	3	12	591	691	.....	.....	.....	.....	.....
Wyoming	7	3	1	3	690	156	106	1	1	8	.....	.....
Total this week.	697	502	31	164	233,019	26,681	27,533	524	1,969	19,451	19,360	19,360
Total last week.	591	389	47	155	149,363	25,984	26,972	554	1,446	18,752	19,003	19,360
Total this year.	26,681	18,294	1,921	6,466	.....	.....	.....	.....	.....	.....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Illinois date from October 15, 1939; New Mexico from August 1, 1939.
† Includes water-input wells.

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Tate 15, ne sw nw 5-1n-2e	1512	1818
Richardson 12, nw se nw 5-1n-2e	1211	1820
Johnson 9, ne sw se 6-1n-2e	1995	1825
Johnson 21, c se se se 6-1n-2e	2646	1824
Carr 5B, ne ne ne 7-1n-2e	1197	1834
Friedrich 2, ne se nw 7-1n-2e	364	1855
Friedrich 3, se ne nw 7-1n-2e	1080	1855
Richardson 3, sw nw ne 7-1n-2e	2667	1860
Tate 6, nw sw ne 7-1n-2e	3220	1867
Hawthorne 22, se sw ne 8-1n-2e	84	2099
Bryant 12, sw sw nw 9-1n-2e	217	1868
Bryant 13, nw nw sw 9-1n-2e	196	1869
Hamlin 4, nw nw ne 4-2n-2e	163	2148
Wallis 1, se se se 19-2n-2e	69	2122
Sweney 2, se sw nw 20-2n-2e	196	1877
Sweney 3, ne sw nw 20-2n-2e	231	2106
Sweney 5, sw ne nw 20-2n-2e	336	2103
Boyce et al, Stover 1, se ne nw 30-1n-2e	*	2375
Southwestern, Warfield 14, se se sw 5-2n-1e	2640	2922
Bialock & Phrarp, Robinson 1, nw ne se 8-2n-1e	*	3133
Big Four, Sherman 1, ne nw nw 9-2n-1e	1410	3004
Booth & Absher, Sisson 1B, nw nw nw 3-2n-2e	150	1948
Magnolia, Chitwood 38, c n ne sw 16-2n-2e	160	1879
Chitwood 39, se ne sw 16-2n-2e	520	2083
Young 26, c n n sw 21-2n-2e	225	2050
Kingwood-Bell, Shanafelt 17A, c w nw ne 20-2n-2e	620	2043
Shanafelt 18A, ne nw ne 20-2n-2e	3024	3502
Shell, Salem Bank 10, ne nw se 20-2n-2e	110	1870
Ohio, Young 14, sw se nw 20-2n-2e	480	1865
Young 15, nw se nw 20-2n-2e	357	2081
Young 16, nw se nw 20-2n-2e	189	1874
Young Heirs 23, nw ne sw 20-2n-2e	3564	2068
Young Heirs 24, nw ne sw 20-2n-2e	528	1875
Young Heirs 26, ne nw sw 20-2n-2e	375	2092
Young Heirs 27, ne nw sw 20-2n-2e	270	1875
Young Heirs 28, se nw sw 20-2n-2e	549	2091
Young Heirs 29, ne sw sw 20-2n-2e	564	2090
Bates & Lichlyter, Bruner 1, se ne sw 33-3n-2e	*	2170
Richland County—		
Pure, Montgomery 9B, sw sw nw 4-3n-9e	228	2583
Montgomery 10B, ne sw nw 4-3n-9e	225	2573
Palmer-Taylor 11, ne ne se 5-3n-9e	261	2582
Hedrich-Brandt Consolidated 1, se nw se 17-3n-9e	67	2995
Rena Campbell 1, c e ne se 1-4n-9e	519	2925
Paseley Consolidated 1, c ne ne ne 1-4n-9e	1159	2895
St. Clair County—		
Winterman, Mense 1, ne ne nw se 33-1n-6w	*	800
Fishbien, Kasner 1, lot 27-1n-10w	*	536
Wabash County—		
P. Wiggens, Sticker 1, nw nw nw 26-1s-13w	*	2640
Landreth Prod. Co., Bump 1, se sw sw 4-2s-13w	*	2830
Continental, Shultz 2A, ne se se 8-2s-13w	78	2439
Blackstock, Kennard 1, nw nw se 9-2s-13w	*	2474
Centralia Ref. Co., Lovelette School 1, sw se sw 9-2s-13w	81	2462
D. & H. Dr. Co., Bump 5, se nw sw 9-2s-13w	60	2449
Fotiades, Epler 2, sw nw se 9-2s-13w	*	2758
Lovelette 2, c nw ne nw 16-2s-13w	2	2492
Gulf, Strasser 2, nw nw nw 16-2s-13w	23	2471
Simmel Service Co., Coe 1, ne ne nw 16-2s-13w	95	1829
Magnolia, Batson 1, ne ne se 17-2s-13w	12	2426
Washington County—		
Chicago Syndicate, I. C. 1, se ne sw 23-1s-1w	*	1592
Heenan & Coe, Dennis 1, sw sw se 14-3s-3w	75	1280
Magnolia, Novak 4, nw nw sw 14-3s-3w	3	1250
Barczewski 3, nw se ne 15-3s-3w	37	1263
Kurwicki 10, ne ne ne 22-3s-3w	25	1279
Shell, Fish 1, c sw se sw 14-3s-3w	25	1299
Sharkowski 8, sw sw sw 14-3s-3w	40	1270
Wayne County—		
Pure, Brach 2A, c e nw nw 34-1n-7e	55	3160
McCrackin 3A, ne ne nw 4-1n-8e	480	3115
Hassleton 1A, c w sw se 28-2n-8e	55	3105
Roach & Voyles, Milner 1, w se 33-1s-7e	420	3291
Weinert, Sprague 3, c e ne se 4-2s-7e	250	3325
Dunlap, Felix 2, se sw ne 34-2s-8e	45	3415
White County—		
Charles Baldwin et al, McIntosh 2, sw nw se 31-3s-8e	29	3391
Nation Oil Co., Hammock 3, se sw se 31-3s-8e	27	3270
Roach & Voyles, Lewis 1, nw se nw 31-3s-8e	7	3374
Texas, Poorman 1, sw se se 31-3s-8e	95	3335
Schriber et al, Woodward 1, sw ne se 20-3s-10e	*	3345
Lacky & Wilson, Rawlins 1, nw nw se 6-4s-8e	*	3438
Mammoth Producers & Refiners, Belle-Fitzgerald 1, ne sw ne 30-4s-11e	*	3025
J. L. Taylor et al, Botsch 1, ne nw nw 6-5s-10e	*	3332
Ford et al, Givens 1, ne ne ne 10-5s-10e	*	3108
Superior Oil Co., Ford 3, c se ne nw 9-5s-14w	75	2180
Ford 4, nw nw ne 9-5s-14w	300	2170
Pennsylvania-Illinois Oil & Gas, Porter 2, c w ne se 12-6s-8e	396	3150
Porter 3, c w se se 12-6s-8e	250	3078
A. C. Wilson, Dagley 1, se se sw 12-7s-9e	*	3175

"T" indicates gas input well.

Indiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Dubois County—		
Damron Bros., Humbert 3, ne sw sw 25-1s-4w	*	690
Knox County—		
M. I. T. Syndicate, Keith 1, se se se 5-5n-9w	*	975
Marion County—		
C. E. Jefferson, Indianapolis Water Co. 1, c n½ s½ 15-16n-3e	¶.10	900
Posey County—		
Sun, Gettman 1, nw sw se 35-6s-12w	*	2168
Superior, New Harmony Realty 15, sw ne sw 10-5s-14w	250	2204
Spencer County—		
Major Oil Co., Haynes 1, se se ne 11-6s-7w	*	1583
E. Lorsh, Fee 1, ne sw nw 12-6s-4w	*	895

Kansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton—		
Rabon et al, Estate 1, c n½ se sw 7-18-15w	¶60	3558
Alpine, Duncan 1, c s½ se nw 8-20-11w	3000	3308
Stanolind, Panning 19, nec se 10-20-11w	1854	3286
Panning 20, csl se ne se 10-20-11w	3000	3080
Jutting 4, se ne ne 15-20-11w	*	3315
Schneider, Steckel 1, c w½ sw ne 11-20-12w	*	3404
Coffey—		
Hollett, Butler 1, se sw se 28-20-15e	*	1639
Cowley—		
Garden, Tompkinson 1, ne sw nw 28-31-4e	457	3332
Douglas—		
Greenway, Grosdedier 1, 130 ft e e½ se ne 24-13-20e	*	740
Ellis—		
Cities Service, Colahan 5, sw nw nw 24-11-17w	3000	3427
Wakefield, Burnett "A" 1, sw se se 1-11-18w	3000	3465
Central, Hadley 6, sw ne se 12-11-18w (otd 1092 ft)	1897	3096
Hall, Oswald "B" 1, swc se 11-12-16w	2515	3128
Ellsworth—		
Skelly, Moran 4, c s½ sw se 31-17-10w	87	3262
Greenwood—		
Aikman et al, Meyers "B" 3, ne sw sw 10-24-12e	8	1792
Miller et al, Wygle 1, ne ne se sw 12-27-10e	150	1890
McPherson—		
Mueller et al, Suffield 3, cwl sw se se 25-19-2w	201	2972
Fain Drlg. Co., Briggs A 1, c w½ sw sw 21-20-5w	*	3586
Sunray, Briggs 1, c w½ sw nw 29-20-5w	1426	3378
Ness—		
Continental, Unruh 1, ne sw c ne 8-18-25w	260	4360
Rice—		
Vickers, Roesler 2, cwl nw ne sw 5-18-10w	3000	3214
Stanolind, Bredfeldt 1, c s½ sw ne 2-19-10w	*	3349
Manke 7, c n½ se se 28-19-10w	1062	3037
Derby et al, Williams 1, c nw ne 14-20-8w	102	3283
Bartlett, Houston 1, nwc 19-20-10w	738	3280
El Dorado Refining Co., Gossman 3, nec sw 5-21-7w	539	3356
Garden et al, Misner 1, c s½ sw ne 21-21-7w	*	3420
Rooks—		
Krueger et al, Tatkenhorst 2, c n½ ne sw 11-9-16w	352	3230
Republic Natural, Riddler 2, c w½ sw 31-10-17w	3000	3604
Russell—		
Stanolind, Krug "B" 2, nec se 27-14-14w	1927	3040
Stanolind, Roesner 4, c s½ nw sw 9-15-13w	621	3149
Rosener 5, c n½ se sw 9-15-13w	2004	3065
Coralena, Sellens 2, swc se 17-15-13w	152	3334
Southern, Letsch 2, sec sw 17-15-13w	96	3271
Sellen 1 "A", c s½ sw ne 19-15-13w	*	3301
Shell, Bender 1, swc se 20-15-14w	*	3430
Coralena, Dumler 4, csl se ne nw 36-15-14w	2033	3316
Stafford—		
Moore, Johnson 5, c n½ ne ne 13-24-11w	1212	3769
Sumner—		
Stelbar, Potueck 1, c s½ sw sw 16-33-2e (otd 3447 ft)	*	3500
Wyandotte—		
DeBetz et al, Masterson 1, ne se nw nw 7-11-24e	*	700
Mid-West, Serwon 1, sec 18-11-24e	10	500

Kentucky

Company, Well and Location	Init. Prod. Bbls.	Depth
Butler County—		
Cumberland Pet. Co., Hawkins 3	10	546
Daviess County—		
Farmer & Chenault, Weaver 4	50	1426
C. E. Daugherty, O'Flynn 8	40	1315
Cane Run Pet. Co., Jackson 14	10	
Huff & Hare, Demmers 2	*	525
Miller & Reily, Howard 1	*	1825
Shaeffer et al, Medley 1	*	1571
L. E. Maxson, S. T. Boone 1	*	957
Hancock County—		
W. J. Flesher, Sanders 1	¶.22	486
McLean County—		
J. D. Reynolds, Howell 2	100	1453
Ohio County—		
M. L. Swartzberg, Hanna 1	10	682
Tooms et al, Smith 3	10	170
J. B. Moore et al, Fleener 1	10	170
Morris Lebow, Coy 4	*	625
O. D. Vickers et al, Sapp 4	*	600

South Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Charenton—		
DeArman, Alleman 5	226	1120
Alleman 8	388	1165
Alleman 9	486	1167
Boudreaux 8	324	1166
Boudreaux 9	65	1168
Kern 9	*	2757
Simoneaux 5	*	1440
Wm. A. Brown, Parro 1	240	6742
Edgerly—		
Sutton-Burton, Embry 1	*	5900
Eola—		
Amerada, Glaze 5	780	8575
Dent 1	625	8563
W. C. Feazel, Sclater 1	720	8570
G. W. Kennedy, Irion 1	757	8579
Sun, Townsend 2	519	8572
Gillis—		
Union Sulphur, Castle 10	321	7920
Iowa—		
Shell, Heyd 30	279	4470
New Iberia—		
Texas Co., Duhe 13	253	3746
West Hackberry—		
Stanolind, School Board 20	*	7939
Beauregard Parish—		
California Co., Long Bell 2, Hickory Branch	*	10,711

North Louisiana

Company, Well and Location	Init. Prod. Bbls.	Depth
Bossier Parish (Bellevue)—		
Gary & Gibson, Connell A-2, 15-19n-11w	12	404
Bossier Parish (Sligo)—		
Triangle Drlg. Co., Herold A-4, 13-17n-12w	250	3019
Caddo Parish (Vivian)—		
Temple Oil Corp., Huckabay-Parker 1, 13-22n-16w	125	2626
Caddo Parish (Pine Island)—		
Cassidy et al, Morgan 1, 2-20n-16w	15	1560
Jones Oil Co., Ober 1, 1-20n-16w	140	1490
J. Ray Murray, Barfield 1, 21-12n-15w	15	1650

[*Continued on next page*]

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Claiborne Parish (Lisbon)—		
Lisbon Expl. Co., Roberta Vaughan 1, 36-21n-5w	61 & ¶5	8901
De Soto Parish (Wildcat)—		
Murray Davis, T. Russell 1, 12-11n-16w	*	2812
La Salle Parish (Urania)—		
Smith Bros., E. H. Kinney 1, 7-10n-2e	10	1527
Sabine Parish (Converse)—		
A. C. Phillips, Wood Preserving 1, 34-10n-13w	50	1952
Sabine Parish (Zwolle)—		
H. N. Sneed, P. Leone 1, 8-7n-13w	10	2116
Union Parish (Monroe) —		
Interstate Nat. Gas Co., Fee 96, 26-22n-3e	¶1½	2202
Memphis Nat. Gas Co., Frost 5, 11-22n-3e	¶1	2204
Webster Parish (Cotton Valley)—		
Woodley Pet. Co., Couch 2, 35-21n-10w	750	8560

Michigan

Allegan County—		
Jacob Bolema, Brower 1, nw nw ne 34-4n-14w	600	1511
V. R. Wilson, Steffes 2, nw nw se 2-4n-13w	45	1655
Freeman Oil Co., Vogt 1, sw ne nw 12-4n-13w	*	1640
Bridger Basin, Smith 2, nw nw se 15-4n-13w	140	1632
Arenac County—		
Gratiot Oil Co., Peavy 2, se se ne 9-20n-4e	150	2609
Barry County—		
Strange Oil Co., Olemstead 1, ne ne ne 2-1n-7w	*	1948
Calhoun County—		
Mar-Cal Dev. Co., Woods 1, sw sw se 13-2s-6w	*	2015
Cass County—		
Flynn & Merrills, Phillips 1, sw sw sw 4-6s-16w	*	773
Clare County—		
Pure, Zink 2, c n se se 27-19n-6w	150	3892
Oil Well Dr. Co., State Bank 1, nw nw 4-17n-5w	*	4135
Isabella County—		
Turner Pet. Corp., Menery 1, se se sw 21-16n-3w	160	3702
Kent County—		
J. W. McIntosh, Huber 1, se se sw 30-9n-12w	*	2405
Smith & Stroms, Molloy 2, se sw sw 28-7n-12w	300	1915
Fisher-McCall, Sackner 3, ne sw ne 29-7n-12w	150	1924
Swanson Consolidated, Slykhouse 7, nw nw se 32-7n-12w	290	1904
Wolverine Oil Co., Schofield 1, nw nw nw 33-7n-12w	400	1916
Hogan Bros., Alabstine 2, se nw nw 2-6n-12w	*	1787
Certainteed Prod. Co., Fee 5, nw ne ne 4-6n-12w	100	1771
Lamar Oil Co., Gravel Co. 5, nw se sw 4-6n-12w	45	1775
Mich. Devonian, Gravel Co. 1, ne se nw 9-6n-12w	*	1230
Monroe County—		
A. V. O&G Co., Roe 2, se se nw 30-6s-6e	*	2137
Roe 5, nw se nw 30-6s-6e	*	2137
Duval 1, sw ne nw 31-6s-6e	250	2110
Montcalm County—		
E. C. Dailey, Johnson 1, sw se ne 13-12n-6w	¶½	1257
Ottawa County—		
Muskegon Dev. Co., Whalen 1, ne ne sw 12-7n-13w	*	1987
Gordon Oil Co., Heyboer 2, ne ne se 25-7n-13w	390	1860
Smith & Stroms, Clarke 1, ne nw sw 26-7n-13w	*	1903
Van Buren County—		
Bloomingdale Dev. Co., Staasak 1, nw se nw 7-1s-14w	110	1192
Regis Cook, Hartley 1, sw se nw 8-1s-14w	*	1267
Hostetler & Fletchers, Niles 1, nw ne sw 18-1s-14w	*	1320
W. E. Dodson, Stockton 1, nw se se 12-1s-15w	*	1233
R. T. & E. Theisen 2, ne ne sw 18-4s-13w	15	1125

Mississippi

Hinds County (Wildcat)—		
G. Jeffreys, Gaddis-McLaurin 1, 17-7n-2w	*	6502
Yazoo County (Wildcat)—		
T. B. Slick, Atkinson 1, 3-10n-3w	*	5043

Montana

Glacier County (Cut Bank Field)—		
Texas Co., Tweedy 3, csw ne 21-35n-6w	405	2944
Toole County (Kevin-Sunburst Field)—		
A. Beardslee, Swears 11, se sw ne 9-35n-2w	100	1666
Kippen Oil & Gas Co., Solberg 1, sw se ne 20-35n-3w	50	1904
Superior Petroleum Co., Aronow 1, n nw sw 12-35n-3w	12	1535

New Mexico

Eddy County—		
Franklin Pet. Co., Yates 4-A, nw ne ne 6-18s-30e	500	2850
Hadlock & Randell, Shelby 1, nw sw sw 10-18s-29e	1080	2545
Kleiner et al, Watson-Smith 2, se sw se 4-18s-29e	60	2543
Eddy County (Wildcat)—		
McClure & Swift, State 1, c nw ne 20-19s-29e	*	2215
Lea County (Halfway)—		
Argo, State-Texaco 1, c nw sw 16-20s-32e	100	2657
Lea County (Hardy)—		
Stanolind, Hill 5-A, lot 12, 6-21-37	335	3780
Lea County (Lovington)—		
Skelly, State 4-0, c w½ nw se 31-16s-37e	460	4950
Lea County (Vacuum)—		
Magnolia, State 2-G, c sw ne 24-17s-34e	259	4726
State-Bridges 50, c se ne 27-17s-34e	209	4705

New York

Allegany County—		
Forest Oil Co., Ackerman, Bolivar	25	1408
R. B. Moore, Daniels, Bolivar	8	1374
MacDonell Oil Co., MacDonell, Bolivar	7	1316
M. J. Crowley et al, Coast et al, Bolivar	8	1262
C. H. Christman & Son, Underwood, Scio	5	1370
Underwood, Scio	6	1362
Underwood, Scio	6	1375
Boyd Oil Co., Drumb, Wirt	7	1345
Richardson Pet. Corp., Towner, Scio	8	1290
J. A. Vincent, Vincent, Scio	6	1263
Lester Young, Norton, Scio	4	1058
Porge Oil Co., Anderson, Alma	8	1360
Messer Oil Corp., "M", Garrison, Alma	9	1466
Water (Intake) Wells—		
Helen Randall, Reid-Pike, Alma	..	1455
Andrews Bros., Minnum, Alma	..	1487
Bradley Prod. Corp., Monitor, Alma	..	1348
Monitor, Alma	..	1372
Monitor, Alma	..	1386
Monitor, Alma	..	1418
Otsquago Oil Co., Pike, Alma	..	1489
Pike, Alma	..	1517
George Oil Co., Scott, Alma	..	1471

Ohio

Ashland County—		
Robinson et al, Kopp 1	1	690
Athens County—		
C. W. Nuzum et al, Niggemeyer 2	2	1715
Cody, Jeffers 2	¶.40	539
Knox County—		
Levin et al, Clutter 3	¶.07	2218
Licking County—		
Lachnett et al, Webber 1	¶.73	....
Medina County—		
Marine Trust Co., Shaw O11	I	354
East Ohio Gas Co., Coones 1	¶1.00	2774
Muskingum County—		
Gas Producing Co., Beetcher 1	*	4245
Noble County—		
J. E. Lumbatis, Pepper 1	¶.10	1912
Stark County—		
Lyons et al, Rohr 1	¶.30	4188
Washington County—		
H. W. Baker, Dunean 3	*	1679
Lawrence Bros., Kuntz 1	*	997

"I" indicates water input well.

Oklahoma

Caddo—		
Johnson et al, Rasberry 1, nw sw ne sw 3-5n-9w	569	3451
Phillips, Farwell 2, 180 ft s se nw nw 35-6n-10w	1008	3426
Carter—		
Jones, Dillard 7, se nw sw ne 22-4s-2w (otd 2171 ft)	21	3714
Comanche—		
Kelly, State 2, nw nwc ne 35-2n-11w	*	260
Melling, Fee 10, ne nec nw 35-2n-11w	*	407
Creek—		
Marion, Keenan 1, swc ne 11-17n-9e	8	1928
Robbins, Brown 1, nec sw 11-17n-9e	6	1884
Curtis, Kroeger 1, swc se 20-18n-9e	*	2890
Kessler, Cartwright 2, c ne ne 29-18n-9e	10	2902
Swift et al, Sundayfield 2, nw swc se 7-18n-10e	30	2018
Garfield—		
Eagle Oil Co., LeGrange 1, nwc 8-23n-3w	*	5503
Champlin, Mackey 1, nwc se 4-24n-8w (otd 6703½ ft)	*	6709
Mackey 2, c s½ ne se 4-24n-8w	*	6720
Grady—		
Graham, Thomas 1, nw sw ne 19-5n-7w	*	3537
Hughes—		
Canavan et al, Bowles 1, c s½ sw ne 5-8n-10e (otd 3908 ft)	¶7½	3680
Jackson—		
Gulf, Herber 1, sec ne 9-1n-20w	6	1795
Kerbo et al, Hunter 1, nec sw 6-1s-19w	*	2670
Hunter 2, nwc sw 6-1s-19w	*	2784
Lincoln—		
Wilcox, School Land 1 "A", ne se sw 16-14n-6e	145	3112
Okfuskee—		
Stekoll, Autry 1, nec 35-10n-11e	*	3125
Aggis, Sporleder 1, nw ne nw 25-11-9e	*	1672
Olsen, Beets 1, ne se ne 20-13n-10e	38	2865
Oklahoma—		
I. T. I. O., Kuhlhoff-Henning 4, nw sw sw 24-11n-3w	41	4055
Okmulgee—		
Wise, Jordan 1, se se nw nw 28-14n-11e	¶9	1900
Selby, Flint 11, ne ne se nw 26-14n-14e	10	1026
Osage—		
Peters et al, Norbla 3, se nwc se 4-23n-10e	6½	2488
Payne—		
Amerada et al, Fruin 4, c e½ se nw 12-17n-1e	35	4850
Helmerich & Payne, Berry 1, c e½ ne ne 14-17n-1e	288	4887
Pontotoc—		
Carter, Craddock 3, sw se ne 25-2n-6e (otd 4325 ft)	55	2580
Simpson-Roodhouse, Mack 1, csl se ne sw 33-2n-7e	*	1876
Pottawatomie—		
Jewell et al, Hibbard 1, sw se sw 21-6n-4e	*	72
Iglehart, Zoehler 2, sw nw ne 4-6n-5e	*	4355
Mudge, Baptiste 4, ne se ne 20-7n-4e	40	3560
Alcorn et al, Rice 3, nw se ne 32-7n-4e	50	4305
Seminole—		
Iglehart, Talmascy 1, nw sw sw 3-6n-5e	*	4077
Magnolia, Carter 2, nec nw 25-8n-7e	80	3324
Stephens—		
Keister, Cox-Harley 1, se swc 19-2s-3w	2	374
Tillman—		
Ray, Ronald 1, nw sw nw 5-1s-19w (otd 2492 ft)	55	2563
Tulsa—		
Epler et al, Voland 1, nec 18-18n-14e	*	1482
Perser et al, Sand Springs Home 1-A, sw sw ne sw 26-19n-11e	¶0.2	1745
Wagoner—		
Garrett, Robinson 8, nec se 21-19n-15e	36	994

Pennsylvania

Bradford District (Water Intake Wells)		
Franchot, Trustee, Campbell	..	....
Forest Oil Corp., 3 wells	..	....
Forest Pet. Corp., 1 well	..	....
Niagara Oil Corp., 7 wells	..	....
Andrus & McDowell, Bing 326	..	....
Bradford District (Regular Completions)		
Miller Bros., et al, Fee	8	....
Mix Creek Oil Co., Fee	1	....
Duffeytown Oil Co., Sullivan	3	....
Forest Oil Corp., 3 wells	3	....
Forest Petroleum Corp	1	....
Niagara Oil Corp., 2 wells	2	....
James Evans, et al, Bing 423	1	....
Alice Freeman, Freeman	2	....
Hillside Oil Co.	2	....
M. Hungiville, McCullough	1	....
F. M. Boocks, Fee	1	....
Bradford Transit Co., 9 wells	9	....

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Middle District		
Anna Goldstein, Continental	1	....
A. E. Kaber, Kenemuth	½	....
C. S. & L. V. Painter, Lot 53	½	....
Butler-Armstrong District		
Larkin, Heck et al, Church	15	....
Mark W. Graham et al, Campbell	2	....
Harvey J. Geibel, Geibel	1	....

North Texas

Archer County (Hull-Silk)—		
Chapman-McFarlin, Wilson 2-C, lot 1	1932	4360
Deep Oil Dev. Co.-R. G. Drl. Co., Little 3, sec 2	888	4380
Helmerich & Payne, Shephard 3	1856	4315
B. M. Hester & Son, Finley 1	776	4302
King Oil Co.-Phillips, Wilson 5-E	1280	4031
Ligon et al, Wilson 2-C, lot 8	808	4390
Petroleum Prod.-United Prod. Co., Shephard 4	1064	4288
Phillips, Moss 6	1736	4332
Sikes et al, Anderson 4	840	4418
Archer County (K-M-A)—		
Browning-Palmer & Gray, Ferguson 1, blk 11	*	4078
Archer County (Mankins)—		
Hopkins et al, Albright 1, sec 10	1656	4685
Archer County—		
Barnes & Traugh, Carson 3-A, sec 1	141	1296
Hamilton et al, Graham 7	40	1130
Green 3-B	†	1148
Johnson et al, Brown 2, sec 2421	*	1423
Kimmell & Woofter, Williams 15	4	579
King Oil Co., Rogers 8, sec 1600	12	1280
Ligon et al, Little 4-A, sec 2	*	1378
Pet. Producers Co., Perkins 1, sec 2417	*	1331
Clay County—		
Costley et al, Taylor 1-D, blk 41	312	1074
Metzner et al, Taylor-Matzner 6, sec 23	*	1231
Clay County (Wildcat)—		
Continental-Superior & Dillard, Ross 1	1136	5400
Cooke County—		
Bridwell Oil Co., Parkey 12	61	745
C. & L. Oil Co., Perkins 7	10	950
Joseph Oil Co., Nat Piott 1	*	926
Whitfield-Pearson & Grimes, Voth 9	100	1665
Cooke County (Walnut Bend)—		
Magnolia, Ramsey 1	776	4842
Sinclair Prairie, Best 15	920	5002
Montague County—		
Beck et al, J. S. Ivins 2	*	2741
Montague County (Nocona)—		
Rogers & Rogers, Astley-Texaco 2	496	4694
Throckmorton County—		
Taylor & Seaberry, McKeichan 1	24	887
Wichita County (K-M-A)—		
Bridwell Oil Co., Mangold 6, blk 34	944	3825
Consolidated Oil Co. et al, James 11	832	4003
E. C. Oil Co., Mangold 19	680	3815
Fain-McGaha, Griffin 4-A	1120	3846
Farrell et al, Waggoner 34-D	960	3854
Grace & Wood, Birk 7	1448	4048
Hammon & Hanlon-Buchanan, Hammon 8	1040	4062
Hanlon & Buchanan, Fassett-Tuttle 5-E	720	4011
Fassett-Tuttle 3-G	624	4075
Palmer & Chenault, McCarthy 12	712	3877
Peckham et al, M. A. Love 4	920	4082
Royal Pet. Corp., James 4	1392	4001
Ryan Cons. Nance 131	96	3815
Southport Pet. Co., Wichita River 7-A	756	4039
Wichita County—		
Corbett et al, Bailey 4	3	555
Mogren & Anderson, Goetze 5, sec 2	*	1708
Ross et al, Mitchell 25, lot 5	3	859
Smith et al, Dodson 5	*	60
Wilbarger County (Consolidated)—		
Consolidated et al, Ancell 3-J	1296	3784
Waggoner Ref. Co., Waggoner Est. 1-GG	392	3750
Wilbarger County—		
Falls Ref. Co., Owens 5	960	3181
Medders et al, Waggoner Est. 4, sec 45	180	2452
Vooheris & Davis, Waggoner Est. 1, sec 30	†	675
Young County—		
Kriss & Hansen, Jeffrey 2, sec 49	*	905
Panhandle-Rankin, Taylor 1, sec 1974	424	4024

South Texas

CORPUS CHRISTI DISTRICT

Aransas County—		
Culton, McCampbell 1 (McCampbell)	¶2 & 40	7366
Manahan, Carlock 6 (McCampbell)	†	7180
Brooks County—		
Magnolia, Rust 1 (WC), lot 14 (La Gloria)	*	7427
Jackson County—		
Magnolia, West 33-A (West Ranch)	800	5615
Jim Wells County—		
Bridwell, Beasley 3 (Ben Bolt)	625	5237
Graham, Bankers A-2 (East Alice)	400	5364
Gravis & Buescher, Muil 1 (Clark-Muil)	450	5497
Myer & Simons, Reynolds & Richardson 1 (Magnolia)	850	5714
Sears & McKenzie, McGehee 1 (Reynolds)	*	3508
Texas Gulf, Miller A-11 (Reynolds)	*	5180
Nueces County—		
Shield, Fulton 1 (WC), sec 4	*	6015
Southern Minerals, King B-11 (Bentonville-King)	200	5750
Stanolind, McCann 16 (Luby)	350	4342
McCann 17 (Luby)	500	5079
Spessard 32 (Luby)	225	4334
Spessard 34 (Luby)	300	4339
Union, Schroeder 2 (Agua Dulce)	¶35 & 125	5091
Wallace 2 (Agua Dulce)	¶25 & 100	4622
Wellington, Driscoll 1-B (WC), (Clara Driscoll)	265	8194
Refugio County—		
Benson & Jones, Rooke A-4 (La Rosa)	500	6412
Hewit & Dougherty, Rooke B-9, (La Rosa)	400	6353
Quintana, Williams B-7 (Tomoconnor)	1500	5928
San Patricio County—		
Plymouth, Kellogg 4 (East White Point)	500	5666
Koonce 1, (East White Point)	500	5660
Randon, Collins 1 (WC), 4 miles west of Mathis, McGloin survey	*	4930
Sinclair Prairie, State of Texas 4 (East White Point)	450	5635

LAREDO DISTRICT

Duval County—		
Blanchard, Parr 1 (WC), survey No. 22 1¾ miles northwest of Muralla field	†	4250
Cox & Hamon, Gorman-Hoffman 1 (WC) (Tarancahuas) sur No. 119	240	3309
Cuellar, Fee B-4 (Hoffman)	40	2796
Dulup, Gruy 1 (WC), survey No. 391, 1½ miles southwest of Rancho Solo pool	*	3010
Duval, Hoffman 1 (Hoffman)	60	2734
Eagle Hill, Duval Ranch 8 (206) (Eagle Hill)	*	2205
Government Wells, Lundell 40 (Lundell)	300	1553
Graham, Webb 5 (Government Wells)	68	1552
Henshaw, Sutherland A-1 (WC), survey 188	*	2692
Hiawatha, Denman 4 (Longhorn)	525	4079
Humble, Dowdy-Fee 23 (Seven Sisters)	¶3½	1234
Ruiz 21 (Loma Novia)	*	2868
Magnolia, Duval County 2 (262) (WC), survey No. 262	*	1680
Weil 3 (113) (Hoffman)	¶2	2997
Miller, Miller 17 (Longhorn)	350	4902
Rogers, Rossen 1 (WC), survey No. 48	*	1129
Rowan & Hope, Lopez 1 (WC), survey No. 544	*	6516
Taylor, Atlee Parr 1 (WC), survey No. 134, 3 miles northwest of Muralla field	*	5014
Turner, Society of Propagation of Faith 1 (WC), sec 176	*	1220
Jim Hogg County—		
Humble, Bass 17 (Kelsey)	450	4749
Neibert, Yeager 1 (WC), survey No. 20	*	1600
La Salle County—		
Vivian, Yeager 1 (WC), survey No. 53, sec 4	*	714
Starr County—		
Moss, Owen & Bishop, Staley 1, (WC), (Charco Blanco) share 76, w½ porcion 79	*	2006
Webb County—		
Arkansas, Adami A-1 (Adami)	69	987
Bridwell, Adami A-3 (Adami)	44	1006
Killam, Fee 5, sur 1575	*	1504
Magnolia, Volpe-Benavides 14 (Volpe)	55	2462
Volpe-Benavides 15 (Volpe)	65	2465
Red Bank, Adami 1 (Adami)	156	982
Adami 2 (Adami)	104	977
Adami 6 (Adami)	94	1007
Schimmel, Benavides A-4 (Volpe)	55	2339
Zapata County—		
Buck, Trevino 7 (Escobas)	73	1383
Buffalo, Hinnant C-22 (Mirando Valley)	72	1974
Interstate, Lopez C-8 (Mirando Valley)	513	1777
Neilson & Wise, Maryland Trust 1 (WC), survey 314, 3½ miles east of Escobas field	*	2614
Texas, Measles 130 (Escobas)	25	1248

SAN ANTONIO DISTRICT

Bexar County—		
Henderson, Beck 1 (WC), sur No. 55, 2 miles south of Martinez	*	440
Liles, Friar 1 (La Coste)	¶¾	1198
Shelton, Genbler 1 (WC), sur No. 49, 2 miles se of Southton	*	873
Caldwell County—		
Crouch, Moses 4 (Salt Flats)	80	2678
Guadalupe County—		
Fetty, Warnecke 1 (WC), Duran sur	*	2075
Pegg, Guadalupe County Rd. 1 (Darst Creek)	60	2622
United North & South, Dix 15 (Darst Creek)	150	2534
Weyel, Lentz 1 (WC), sur No. 52	5	792

West Central Texas

Brown County—		
Hamer et al, Howell 3	40	1213
Knyaston et al, Hill 1, sec 35	*	1550
Walker et al, Strange 1	*	464
Callahan County—		
Green & Owens, Anthony 6, sec 2	*	543
Coleman County—		
Shallow Oil, Inc., Brown 1	*	1010
States Oil Corp. et al, Morris 1	682	3602
Eastland County—		
Ewell et al, Parmer 1	*	750
Palo Pinto County—		
Adkisson et al, Costello 9	70	2338
Goble-Moore Drl. Co., Costello 2-C	16	1405
Shackelford County—		
Alexander et al, Fee 3	¶1	550
Charter O&G Co., Herrington 5	*	1636
Georgian Corp., Balch 3, sec 398	15	583
Balch 9, sec 508	8	590
Hooker et al, Walker 10, sec 383	4	375
Owens-Snebold Oil Corp., Haterius 6	1216	3205
Roeser-Pendleton & Conoco, Cook 2-A-113	43	1583
Smart et al, Sedwick 1, sec 2	*	582
Stephens County—		
Fagg et al, Richardson 1	231	3944

West Texas

Crane County (Church-Fields)—		
Gulf, University-Lassiter 3-B	167	3152
Ector County (Foster)—		
A. & M. Oil Co., Johnson 1	502	4305
Atlantic, Johnson 2-E	110	4250
Broderick & Calvert, Witcher 16	470	4285
Witcher 17	343	4315
Stanolind, E. F. Cowden 37-A	922	4150
E. F. Cowden 33-B	736	4220
Witcher 26	2143	4165
Ector County (Goldsmith)—		
Gulf, Goldsmith 236	936	4203
Landreth Prod. Corp., Scharbauer 8-P	188	4215
Ector County (Judkins)—		
Cosden Pet. Corp., T. P. Land Trust-Pure 4	698	3742
Ector County (Jordan)—		
Shell, University 8-D	810	3664
Ector County (North Cowden)—		
Texon O&L Co. et al, Roberts-Conoco 6	8132	4370
Gaines County (Cedar Lake)—		
Stanolind, American Warehouse Co. 1	983	4740
Gaines County (Seminole)—		
Atlantic, Riley 1-B	†	3365
Hockley County (Slaughter)—		
J. W. Murchison et al, Slaughter 2	1508	5010
Jones County—		
Felix Bowen et al, Bigham 1	312	1893
Fain-McGaha Oil Corp., Burns 2	100	1942
Humble, Spencer Lumber Co. 4	1664	3230
Moutray Oil Co.-Lon King, Pritchard 3	104	2098
Jones County (Wildcat)—		
Danciger, B. P. Davenport 1	*	3454
G. T. Kimball-Bohner & Carroll, Herndon 2	2	2895
Pecos County (Lehn)—		
Sahara Oil Corp., O'Brien-Sullivan 2-B	164	1688
Scurry County (Sharon)—		
Stoddard et al, McClure 4	150	2447
Scurry County (Wildcat)—		
Ordovician Oil Co., Sterling 1	*	1201
Taylor County—		
McGarr Bros. & Joe Evans, Shepard 1	*	1752
W. J. Murray et al, Evans 4	182	1750
Ward County—		
W. A. Black & Son, Texas Cotton Ind. 3	*	1926
Sinclair Prairie, Archenhold 20	208	2652
Archenhold 21	319	2651
Winkler County (Kermit)—		
Stanolind, McCutcheon 1	130	3170
Winkler County (Keystone)—		
Peck-Croft & Richardson, Keystone-Sun 2	289	3467
Yoakum County (Bennett)—		
Magnolia, H. Mahoney 4	1060	5215
Yoakum County (Wasson)—		
Aloco Oil Co., Wooten-Texaco 8	768	5143
Continental, Kendrick 2-868	640	5084
Danvers et al, Anderson-Ohio 1	558	5210
Milhoan Prod. Co., Willard 6	1058	5160
Willard 7	1177	5170
Willard 8	1672	5170
Shell, Baumgart 3-D	834	5161
Skelly, Hancock 2	918	5210
Rhodes 4	1004	5070
Yoakum County (Wildcat)—		
Atlantic (Sloan-Zook), Fitzgerald 1	*	5150

*Failures; †Junked; ¶Million cu. ft. gas.

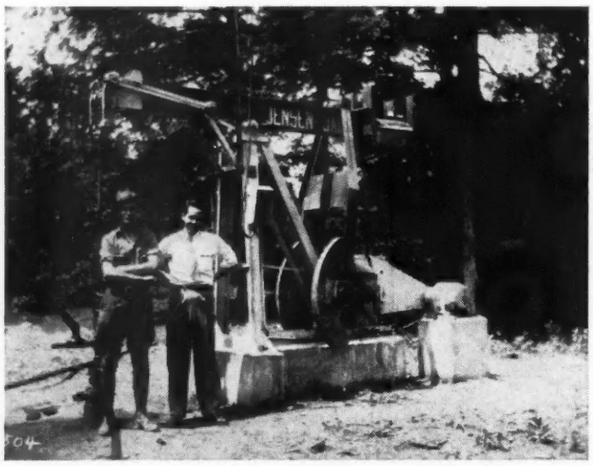
United States Well Completions—*Continued*

Texas Panhandle

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Magnolia, Fee (lse. 244) 67	569	3070
Gray County—		
Humble, Haggard 6	391	3266
Magnolia, W. C. Archer 6	83	3285
John Haggard 14	368	3300
Ryan Consol. Pet. Corp., Barrett 2	562	3297
Shell, Hughey 5	363	3232
Stanolind, Mertens 12	318	3298
Texas Co., Barrett 8	149	3300
Wilcox O&G Co., Combs-Worley 39	517	2985
Hutchinson County—		
Dunigan et al, Parks 1	*	3300
Power Pet. Co., Haile 6	459	3055
Stanolind, Moore 14	204	3156
H. B. Terry 21	166	3009
Texas Co., Lewis 18	228	3015
Moore County—		
Texoma Nat. Gas Co., Haas 2	*	3343

Texas Gulf Coast

Company, Well and Location	Init. Prod. Bbls.	Depth
Clear Lake—		
Humble, Humble-West Fee C-26	129	5912
Collegeport—		
McDannald, Shell 1	¶2½	4100
Woodhouse 1	¶2½	3760
Cotton Lake—		
Humble, Lawrence D-2	120	6590
Boling—		
L. Patterson, Bay 44	40	408
Dickinson—		
J. K. Hughes, Ecret 7	416	8998
Humble, Townes 7	*	9150
Friendswood—		
Humble, Kiesling & Dixon 17	568	6048
Hardin—		
R. Y. Smith, Cochran 1	118	7624
Hastings—		
Stanolind, Curkeet 36	574	6100
Paul 25	499	6110
Sneed 20	456	6080
Ware 7	458	6110
Hull—		
Republic, Dolbear 166	16	2248
Humble—		
Sun, River 96	107	1235
Joe's Lake—		
Republic, Fee 29	273	7710
Lovell Lake—		
Humble, Jefferson Land 8	160	7788
Magnet—		
Humble, Cockburn 22	100	5545
Martha—		
Pan American, Hutcheson 1	*	8972
Silsbee—		
Republic, Brooks 30	396	6943
Spindletop—		
Abbott Prod. Co., Sun Oil Co. 2	147	887
Thompson—		
Humble, Davis 16	516	5410
H. M. Naylor, Hampil 3	941	7936
Tomball—		
Humble, Fee-Zimmer 1	50	5565
Withers—		
Texas Co., Pierce Estate B-41	47	5550
Pierce Estate C-66	75	5544
Ft. Bend County—		
Superior Oil Corp., A. P. George 1, Smithers Lake area, W. Martin sur	*	8010
Galveston County—		
Hebert & Smith, Harris 1, Galveston Island, Hall & Jones sur	*	6706
Newton County—		
W. M. Oil Co., Smith 1, s of Call, H. & T. B.	*	8005



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East Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Hunt, Bradford 22-B (98.15-ac)	480	3642
McMurrey et al, Roberson 17 (145.8-ac)	1500	3818
Stanolind-Devonian, Milstead 19 (90¼-ac)	1200	3736
Kilgore Area—		
Sinclair Prairie, King 65-A (366.7-ac)	2500	3583
Marion County (Jefferson-Rodessa)—		
Tippett Oil Corp., Howard 2, Jno. Hanks sur	300	6058
Houston County (Kittrell)—		
Houston et al, Reynolds 1	*	1200
Rusk County (Wildcat)—		
Bolton et al, Wood 1	†	3130

West Virginia

Company, Well and Location	Init. Prod. Bbls.	Depth
Boone County—		
E. C. Hanna, Nelson 1	¶.21	1950
Calhoun County—		
Yoak, Hathoway 1	5	1992
Clay County—		
Pittsburgh & W. Va. Gas Co., Dickinson 1	¶5.00	1457
Gilmer County—		
Massey & Jarvis, Yeager 2	¶.15	1423
Ellis, Pickens 2	*	1677
Hancock County—		
R. J. Braden Co., Brenneman 54	2	946
Kanawha County—		
United Fuel Gas Co., Sisson 4859	¶6.98	5043
Spartan Gas Co., Reese 1	¶.49	2183
Lincoln County—		
Martin Gas Co., Bias Heirs 1	¶.25	2124
Pleasants County—		
McBurney et al, First National 1	¶.08	1976
Ritchie County—		
Carnegie Nat. Gas Co., Tate 1	4	2117
Roane County—		
Boggess & Dodd, Vandevender 1	*	1709
Upshur County—		
Cumberland & Allegheny Gas Co., Long 1	¶.38	4505
Wayne County—		
Southwestern W. Va. Gas Co., Pritchard 25	¶.09	2969
Owens-Libby-Owens, Glenhayes 3	*	4100
Wood County—		
Biddle et al, McKenna 1	1	1449

Wyoming

Company, Well and Location	Init. Prod. Bbls.	Depth
Fremont County (Big Sand Draw Field)—		
Sinclair-Wyoming Oil Co., Sand Draw-Unit 1, csl ne ne 5-32n-95w	¶9½	4403
Niobrara County (Lance Creek Field)—		
Continental Oil Co., Apex 4 OPC-1, c nw ne ne 34-36n-65w	620	5539
Sweetwater County (Lost Soldier Field)—		
Sinclair-Wyoming Oil Co., Lost Soldier 87-A, sw se se 3-26n-90w	50	2204
Weston County (Osage Field)—		
Charles Martens 20, nw nw ne 19-46n-63w	20	1351
Patterson Oil Co., 20, ne se se 17-46n-63w	*	465
Wheedon Oil Co., 20, nw nw se 16-46n-63w	*	240
21, cel se nw 16-46n-63w	*	280

WILDCAT REPORT
New Starts and Completions

CALIFORNIA

FIRST REPORTS

San Diego County—John F. Sheran's Sheran 1, 786 ft n, 583 ft w sec 3-12s-8e, Imperial Valley area, lcn.

Imperial County—Venice Oil & Ref. Co.'s Imperial 1, 1500 ft n, 200 ft e swc 1-11s-13e, Imperial Valley area, lcn.

Kern County—Continental's Community 1, 330 ft s, 330 ft w nec 12-28-24, Shafter area, lcn.

ILLINOIS

FIRST REPORTS

Clinton County—Bell Oil Co.'s H. Knolhoff 1, 200 ft from east line and 300 ft from north line, se sw 2-1n-2w, top Glen Dean 1018 ft, dr 1120 ft.

Hamilton County—Alma Oil Co.'s Federal Chemical & Coke 1, ne ne se 9-7s-6e, loc.

Madison County—R. J. Jennings et al's H. S. Wagner 1, ne sw sw 22-4s-5w, loc.

Randolph County—A. C. Gass' Schulze 1, 550 ft from north line and 330 ft from east line, se nw 2-7s-6w, loc.

Wabash County—Delta Drilling Co.'s D. J. Cutter 1, se se se 17-1s-12w, rig. Unknown's Baumpgard 1, nw ne se 1-1s-13w, shut down with surface casing set.

Wayne County—Bates & Lichlyter's Rister 1, se se nw 20-3s-8e, rig. Randall et al's Horton 1, se se se 12-3s-9e, rigging up. John Russell's J. W. Warren 1, sw ne sw 21-1s-6e, rig.

White County — Helmerich & Payne and Eason Oil Co.'s Hughes 1, ne ne nw 19-4s-14w, deepening from 2621 ft, top Hardinsburg 2660 ft, top Golconda 2670 ft, dr 2745 ft.

COMPLETIONS

Clinton County — Norton & McWilliams' Athoff 1, c s½ ne sw 9-1n-3w, Santa Fe tnp, top Cypress 1044 ft, abnd 1074 ft. W. O. Burroughs' C. A. Adams 1, se sw se 12-3n-1w, Eastfork tnp, top Ste. Genevieve 1588 ft, abnd 1707 ft.

Edgar County—A. M. Meyers' Schneider 1, nw sw ne 29-13n-13w, Grandview tnp, top Devonian 1463 ft, abnd 1620 ft.

Edwards County—Anderson & Broadus' G. Harms 1, sw ne sw 17-1s-14w, Bone Gap tnp, top St. Louis 3148 ft, abnd 3151 ft.

Fayette County—Oil, Inc.'s C. T. Wade 1, nw sw ne 28-5n-4e, Laclede tnp, abnd 2511 ft.

Gallatin County—Delta Drilling Co.'s Wineberger 1, w½ nw nw 31-3s-9e, top St. Louis 2670 ft, abnd 2700 ft.

Hamilton County—Alma Oil & Gas Co.'s Federal Chemical & Coke 1, sw sw se 9-7s-6e, top St. Louis 3389 ft, abnd 3389 ft.

Hancock County—Minnie & Grady's Roberts 1, s½ nw sw 24-4n-5w, St. Marys tnp, abnd 383 ft.

Marion County—Boyce et al's Stover 1, se ne nw 30-1n-2e, deepened from 1835 ft, top Fredonia 2282 ft, abnd 2375 ft.

Washington County — Chicago Syndicate's I. C. R. R. 1, se ne sw 23-1s-1w, top Benoist 1582 ft, abnd 1592 ft.

White County—Ford et al's Givens 1, ne ne ne 10-5s-10e, Hawthorne tnp, top Ste. Genevieve 2952 ft, abnd 3108 ft. Mammoth Producers & Refiners' Belle-Fitzgerald 1, ne nw ne 30-4s-11e, Phillips tnp, top Fredonia 2963 ft, abnd 3025 ft. Schreiber et al's Woodard 1, sw ne se 20-3s-10e, Gray tnp, top McClosky 3663 ft, abnd 3345 ft. J. L. Taylor et al's E. Botsch 1, ne nw nw 6-5s-10e, Hawthorne tnp, top Fredonia 3238 ft, abnd 3332 ft. A. C. Wilson et al's B. Dagley 1, se se sw 12-7s-9e, Heralds Prairie tnp, top Ste. Genevieve 3057 ft, abnd 3175 ft.

INDIANA

FIRST REPORTS

Gibson County—Fotaides' Fleener 1, se nw se 21-3s-12w, moving in material. J. E. Amis' Dunn 1, 50 ft from north line and 100 ft from west line, nw ne 19-3s-13w, dr 1300 ft.

Perry County—Hawk & Damron's Dotterweich 1, se ne sw 8-4s-3w, rig.

Posey County—Joe Minton et al's Hill 1, 5030 ft from east line and 1660 ft from north line, sec 7-4s-13w, loc.

COMPLETIONS

Dubois County—Frank Damron's Humbert 3, 400 ft from north line and 400 ft from east line, sw sw 15-1s-4w, abnd 690 ft, sulphur water in hole.

Posey County—Sun Oil Co.'s Julia Gettman 1, nw sw se 35-6s-12w, top Hardinsburg 2142 ft, abnd 2168 ft.

KANSAS

FIRST REPORTS

Butler County — National Refining Co.'s Smith 1, ne nw se 9-28-5e, lcn.

Ellsworth County—Bartlett et al's Janssen 1, sec 21-17-9w, dr.

Johnson County—Kasper's Kaths 1, sec nw 33-13-22e, dr.

Marion County—Troxwell et al's Bezdek 1, ne sw sw 32-17-4e, machine.

Rice County—Pryor et al's Southern 1, c n½ ne ne 4-19-10w, lcn.

COMPLETIONS

Barton County—Ash and Crown Petroleum Co.'s Montgomery 1, nwc 11-16-11w, s Davidson pool, top Lansing 3029 ft, top Arbuckle 3393 ft, hfw 3393-99 ft, top Gorham 3399 ft, abnd 3422 ft.

Ellis County—Virginia Drilling Co. et al's Craig 1, cel se se 8-11-16w, e Cress pool, top Lansing 3074 ft, base Kansas City 3300 ft, top Conglomerate 3352 ft, top Arbuckle 3454 ft, abnd 3470 ft.

Greenwood County—Marylyn Oil Co.'s Burke 1, nec sw 27-24-11e, e Wiggins pool, abnd 50 ft.

McPherson County—Sunray Oil Co.'s Anderson 1, cwl sw nw 17-20-5w, ne Bornholdt pool, top Mississippi 3389 ft, top Viola 3750 ft, top Simpson 3777 ft, sso 3780-86 ft, top Arbuckle 3853 ft, abnd 3875 ft.

KENTUCKY

FIRST REPORTS

Daviess County—I. C. Huff et al's Ambrose 1, 2550 ft from north line and 4100 ft from west line, sec 5-N-31, rigging up machine.

COMPLETIONS

Daviess County—A. D. Schaeffer et al's Dr. Medley 1, 144 ft from west line and 1001 ft from north line, sec 3-P-29, abnd 1571 ft.

SOUTH LOUISIANA

FIRST REPORTS

St. Landry — Pure's Boagni 1, Opelousas area, 990 ft s of n line and 767 ft w of e line of block 17, sec 21-6s-4e, lcn.

COMPLETIONS

St. Martin Parish—Wm. Helis' Levert-St. John 2, 400 ft s of Lever-St. John 1, 33-9s-7e, abnd 8157 ft.

NORTH LOUISIANA

FIRST REPORTS

Bienville Parish—Harry Hanbury & Standard, Holsun Unit 1, nec sw ne 29-18n-6w, lcn.

COMPLETIONS

DeSoto Parish—Murray Davis, T. Russell 1, sec 12-11n-16w dry abn at 2812 ft.

MICHIGAN

FIRST REPORTS

Barry County—Transwestern Oil Co., Tobias 1, 12-2n-9w, rig.

Clare County—Sun Oil Co.'s Switzer 1, c n½ nw ne 26-19n-3w, dr.

Midland County—C. L. Maguire's Clark 1, se se se 32-16n-2w, dr.

Van Buren County—H. A. Merchant's Slee 1, nw se nw 17-1s-16w, lcn.

St. Clair County—Lee Brown's Maynard 1, se se sw 23-8n-16e, dr.

COMPLETIONS

Barry County—Strange Oil Co.'s Olemstead 1, ne ne ne 2-1n-7w, Traverse 1843 ft, abnd 1948 ft.

Calhoun County—Mar-Cal Development Co.'s Woods 1, sw sw se 13-2s-6w, abnd 2015 ft.

Cass County—Flynn & Merillas' Phillips 1, sw sw sw 4-6s-16w, Traverse 748 ft, abnd 773 ft.

Clare County—Oil Well Drilling Co.'s State Bank 1, nw nw 4-17n-5w, Dundee 4076 ft, abnd 4135 ft.

Kent County—J. W. McIntosh's Huber 1, se se sw 30-9n-12w, Traverse 2301 ft, abnd 2405 ft.

Ottawa County — Muskegon Development Co.'s Whalen 1, ne ne sw 12-7n-13w, Traverse 1967 ft, abnd 1987 ft. Smith & Stroms' Clarke 1, ne nw sw 28-7n-13w, Traverse 1845 ft, abnd 1903 ft.

MISSISSIPPI

FIRST REPORTS

Issaquena County—W. E. Hall, Charping 1, c ne nw 29-10n-8w, materials.

Jefferson Davis County—Fred E. Courson et al, L. J. Bailey 1, sw sw 4-6n-18w, rig.

Warren County—Burden & Cummings, T. M. Morrissey 1, ne ne 8-17n-2e, rig.

COMPLETIONS

Hinds County—G. Jeffreys' Gaddis-McLaurin 1, 150 ft e and 274 ft s of nwc sw 17-7n-2w, elev 266 ft, base Coquina Beach lime 6285 ft, abnd 6502 ft.

Yazoo County—T. B. Slick, Atkinson 1, ne sw 3-10n-3w, abnd 5043 ft igneous material.

NEBRASKA

FIRST REPORT

Pawnee County—Blaser et al's Wilson 1, ne nw nw 4-1n-10e, co 350 ft.

NEW MEXICO

FIRST REPORT

Harding County—A. S. Waddell & Casthwait's Mathes 2, near c ne nw 10-14n-31e, dr 1910 ft.

COMPLETION

Eddy County — McClure & Henry Swift's State 1, c nw ne 20-19s-29e, elev 3321 ft, hfw (sulphur), abnd 2206-15 ft.

OKLAHOMA

FIRST REPORTS

Kay County—Marland Oil Co.'s Kregar 1, sec ne 4-25n-2w, rig.

COMPLETIONS

Kingfisher County—Anderson & Prichard et al's Geis 1, c ne sw 15-18n-9w, 6 mi n Loyal, top Checkerboard 6720 ft, top Oswego 6870 ft, top Mississippi 7950 ft, td 8507 ft, pb 7365 ft, perf 50 shots, 7338-48 ft, acidized 5000 gals, formation too hard for acid to take, 2,750,000 cu ft gas, 10 to 12 bbls, distillate, 50 gr.

Kiowa County—Heggerling et al's Bozeman 1, sec ne 14-5n-18w, 8 mi s Hobart pool, td 600 ft, abnd. B & M Drlg. Co.'s Burnett 1, sw ne ne 30-7n-20w, 1½ mi e Granite pool, top Granite Wash 973 ft, abnd 1015 ft.

Pottawatomie County—Harper et al's Robinett Estate 1, se ne nw 2-9n-4e, 1½ mi n North Earlsboro pool, top Hunton 4415 ft, top Sylvan 4441 ft, top Viola 4535 ft, abnd 4566 ft.

Seminole County—Hall, Troup et al's Harber 1, nec nw 6-9n-7e, .2 mi n East Seminole pool, top Gilcrease 3720 ft, top Cromwell 3751½ ft, top Booch 3658 ft, td 3733 ft, pb 3731 ft, perf 30 shots 3720-26 ft, swabbed 12 bbls, perf 11 shots 3650-70 ft, sw, abnd.

Stephens County—Johnson's Baker 1, c se nw 35-2s-6w, 1½ mi s Woolsey pool, top Arbuckle 1939 ft, abnd 2021 ft.

EAST TEXAS

FIRST REPORTS

Anderson County—J. C. Cook et al's Royall-Davey 1, 120 ft s and 20 degrees e of Humble's Davey-Taylor dry hole. L. McCloud sur, n of Jarvis, cem 12½ ft cas 45 ft for shallow test.

Freestone County—A. G. W. Biddle et al's Ed. Nettles 1, 400 ft sw of ne and 480 ft se of nw lines of 70-ac tr, Y. G. Dollahite sur, 6 mi nw Fairfield, elev 413 ft, dr 1220 ft.

Navarro County—Topaz Oil Co.'s R. C. Haynes 1, 1250 ft along ne line from nwc of 275-acre tr, thence 150 ft nw at right angles, J. W. Moore sur, 4 miles ne of Bazette, cem sur pipe.

COMPLETION

Rusk County—Jeff Bolton et al's Wood Hall 1, 330 ft out of sec blk 10, J. I. Sanchez sur, 2½ mi nw New Salem, jkd 3130 ft and skid rig.

NORTH TEXAS

FIRST REPORTS

Jack County—Buffalo Oil Co.'s Riddell 1, 1250 ft from s and 330 ft from e lines S. L. Clark sur A-1944, lcn.

Montague County—Walter K. Jones et al's E. E. Johnson 1, 330 ft from se and 440 ft from ne lines sw E. T. Ry. sec 5, A-230, 4 mi se Montague, rur.

COMPLETIONS

Clay County—Continental et al's Ross Bros. 1, 1650 ft from n and 330 ft from w lines blk 31, W. Walker sur A-703, 4½ mi s Jolly, top Home Creek (Canyon) 1990 ft, top KMA lime 4090 ft, top Bend (Smithwick) 5350 ft, saturated pay 5358-5400 ft, used 8000 gals acid, flowed 142 bbls 43-gravity oil 3 hrs via ¾-inch choke after shutin 9 days.

Montague County—L. S. Youngblood-R. L. Foree-Feagin & Grimes' W. L. Admire 1, 330

ft out of sec 80-acre lse, G. W. Fisher sur A-1223, abnd in Strawn 4520 ft.

WEST TEXAS

FIRST REPORTS

Crockett County—Moore Exploration Co.'s H. M. Halff 2, 330 ft from n and 4525 ft from w lines I&GN sec 65, blk 1, cem sur pipe.

Ector County—Stanolind O&G Co.'s W. F. Cowden 1, c se sw T&P sec 4, blk 43, T-1-N, lcn for 5200-foot test.

Lynn County—Guthrie-Lake Oil Co.'s Mary L. Shoe 1, 855 ft from e and 874 ft from n lines nw E. L. Ry. sec 20, blk 8, 5 mi ne O'Donnell, machine.

Mitchell County—Ewing & Hanes' C. L. Grable 1, sw sw ne H&GN sec 195, blk 3, lcn.

Pecos County—O. E. Schkade et al's C. S. Lehman 1, 2450 ft from s and 990 ft from w lines H&GN sec 107, blk 8, testing hfo 43-59 ft.

Taylor County—T. S. Hose et al's Charlotte Bond 1, 480 ft from n and 864 ft from e lines sec 40, Blind Asylum Lands, dr 370 ft.

COMPLETIONS

Jones County—Danciger O&R Inc.'s B. P. Davenport 1, ne nw ne sec 23, Deaf & Dumb Asylum Lands, elev 1559 ft, abnd 3454 ft.

Scurry County—Ordovician Oil Co.'s T. J. Sterling 1, se ne se H&TC sec 127, blk 97, base salt 1170 ft, abnd 1201 ft.

Yoakum County—Atlantic Ref. Co.-Sloan-Zook's J. E. Fitzgerald 1, SEc sec 22, blk D, J. H. Gibson sur, elev 3617 ft, top anhydrite 2320 ft, top brown lime 3910 ft, top solid lime 4305 ft, first water at 5124 ft, increase 5145-50 ft, abnd.

WEST CENTRAL TEXAS

FIRST REPORTS

Hood County—J. M. Seaberry et al's S. L. Davis 1, 150 ft from s and 600 ft from e lines of M. Setzer sur, se edge Granbury, dr 110 ft.

SOUTH TEXAS

FIRST REPORTS

Bee County—Fred Wood's G. Q. Mauldin 1, 150 ft ne line, 1200 ft se line of J. Poitevent sur No. 1, ab 257, 3 miles n of Mineral, dr 1350 ft.

Bexar County—Joe A. Noake's San Antonio Suburban Irrigated Farms 1, lot 4, blk 75, San Antonio Suburban Irrigated Farms, W. Miller sur No. 180, dr 250 ft. Philtop Oil Gas Co.'s Patton A-1, Fernando Rodriguez sur, 1 mile w of Mitchell Lake, dr 1668 ft.

Duval County—Fred P. Schwab and Bill Carlisle's Driscoll 1, J. Poitevent sur No. 325, rigging up. Shell Oil Co.'s F. Lopez 1, John S. Givens sur No. 372, 7 miles nw of Benavides, lcn. G. Stewart and C. H. Nye, W. R. Peters 1, BS&F sur No. 791, 3 miles e of Lopez field, lcn.

Live Oak County—George M. Church's Wuthrich 1, John Turner sur, 7½ miles w of Three Rivers, spudded.

Nueces County—Southern Minerals Corp.'s Robert Whitliff 1, Laureles Farm Tracts, Ramon Yno Josa Grant, 3 miles se of London field, rigging up.

San Patricio County—Tom Graham Oil Co.'s Coates 1, sec 28, George H. Paul subd of the Welder Ranch, set surface casing. Nueces Royalty Co.'s Ragsdale Bros. 1, G. T. Tabor sur, 2 miles n of Old White Point, set surface casing. Kirby Sharp's Hart 1, lot 61, Welder & Odem subd, W. C. Burgess sur, 1 mile n of Odem, rigging up. Southern Minerals Corp.'s Sparks 1, sec 63, George H. Pauls subd, J. J. Welder subd, 9 miles n of Edroy, 6 miles ne of e Mathis field, moving in.

Starr County—Clopton & Mitchell et al, Seabury 1, 5 Share 46, Porcion 80, 6 miles ne of Rio Grande, dr 72 ft. T. E. Stephens' Y Garcia De Garcia 1, of Share 7-B Porcion 71, 12 miles n of Roma, loc. Sun Oil Co.'s Encarnacion Rodriguez 1, Santa Teresa Grant, 5 miles nw of Sun pool, 3 miles sw of Kelsey field, line of Grant, set surface casing. Warner & Mitchell's State Bank & Trust Co. 1, Share 18, Porcion 75, 5 miles n of Lindberg, spudded.

Victoria County—Mayo et al's Ragsdale 1, Valentin Garcia sur, moving in. Trinity Drillers' Moeller 1, 34-ac lease in blk 34 Four League grant to City of Victoria, drill stem test 2526-54½, developed 1050 pounds of gas pressure through ⅝-inch choke in 3½ minutes, drill stem test 5551-55½, recovered 1400 feet oil with gas flow through ¼-inch choke in 15 minutes, 19.9 gravity, set casing, waiting on cement.

Webb County—F. J. Hynes' A. M. Bruni 3, T. Burtrends survey 2184, rigging up. E. S. Joslin et al's Adami 1, sur 27, 1 mile w of Adami field, dr 650 ft. O. W. Killam's Bruni Estate 3, blk 77, Killam subd, El Ranchito Pasture, Jose W. Borrego gr, loc.

COMPLETIONS

Bexar County—A. E. Henderson's Beck 1, Blk 5127, M. C. Oliver sur No. 55, 2 miles s of Martinez, 1½ miles ne of Eckert, abnd 440 ft. G. H. Shelton's Genbler 1, Adams Stafford sur No. 49, 2 miles se of Southton, abnd 873 ft.

Brooks County—Magnolia Petroleum Co.'s Rust 1, Lot 14, Blk 11, subd of Lands Adjoining Townsite of La Gloria, abnd 7427 ft.

Duval County—Blanchard et al's Parr 1, T. C. Rogers sur No. 22, 1¾ mile nw of Muralla field, 12 miles nw of San Diego, junked 4250 ft. Cox & Hamon & Gorman-Yoakam's Gorman-Hoffman 1, BS&F sur No. 119, 2 miles e of Hoffman field, flowed 50 bbls 21 gr 5 hours, ⅝-inch choke, perforated 2014-35 ft. Dulup Oil Co.'s Gruy Estate 1, sur 391, J. Poitevent sur, 1½ miles sw of Rancho Solo pool, abnd 3010 ft. Henshaw Brothers' Sutherland A-1, sur 188, 4 miles n of Rancho Solo field, abnd 2692 ft. Magnolia Petroleum Co.'s Duval County Ranch Company 2 (262), sur 262, 2 miles nw of Piedra Lumbre field, abnd 1680 ft. H. D. Rogers' J. Rossen 1 (2nd well), sur 48, 3 miles sw of Munson field, abnd 1129 ft. Rowan & Hope's Lopez 1, sur No. 544, 7 miles east of Benavides, abnd 6516 ft. Taylor Refining Co.'s Parr 1, M. Rogers sur No. 134, 3 miles nw of Muralla field, 12 miles w of San Diego, abnd 5014 ft. Joseph H. Turner's Socley for the Propagation of Faith, 220 ft s line, in 40-ac tr, sec 176 BS&F sur, 2½ miles e of Adami field, abnd 1220 ft.

Guadalupe County—C. L. Fetty's Warnecke 1, 100-ac tr in Viciente Duran sur, abnd 2075 ft. Edgar Weyel et al's Lentz 1, U. Michell sur 52, rigging up to pump, estimated 2 barrels per day, 792 ft.

La Salle County—John Vivian's Yeager 1, blk 4 W. H. Wallace subd of Louis Yeager Ranch, sur 53, abnd 714 ft.

Nueces County—Shield Oil Co.'s Fulton 1, Lot 8, Nueces River Park Irrigation subd, sec 4, Mariano Lopez De Herrera gr, 3 miles nw of Robstown, abnd 6015 ft. Wellington and Pan American Prod. Co.'s Driscoll 1-B, 80-ac lease, John Low sur, Ab-206, 195.9 barrels in 18 hours on pump, perforations 5290-5303 ft with 12 shots.

San Patricio County—Randon Oil Co.'s Collins 1, Tr. 39 of Worth oil subd, Collins tr, in Edwin J. McGloin sur, 4 miles west of Mathis, abnd 4930 ft.

Starr County—Moss, Owen & H. C. Bishop's Staley 1, Share 76 w½, Porcion 79, abnd 2006 ft.

Zapata County—Nielson & Wise's Maryland Trust Co. 1, blk 11, sur No. 314, 3½ miles e of Escobas field, abnd 2614 ft.

TEXAS GULF COAST

FIRST REPORTS

Ft. Bend County—R. N. Ranger's Sugarland Industries 1, n of Rosenberg, 990 ft fr s and 443 ft fr w line of lease, J. Foster sur, lcn.

Chambers County—Standard of Texas' State 1-234, Galveston Bay, 440 ft fr nw line and 440 ft fr sw line of tract, lcn.

Montgomery County—Housh & Thompson's Calfee 1, nw of Conroe, center of 10-ac lease of se end of 81-ac tract, J. McDillon sur, lcn.

Wharton County—Bennett & Campbell's Harrison & Mitchell 1, Lissie area, 466 ft fr ne and se lines of 40-ac tract, C. H. & H. No. 21, lcn.

COMPLETIONS

Ft. Bend County—Superior Oil Corp.'s George 1, Smithers Lake area, 4170 ft fr sw line and 2085 ft fr se line of W. Martin League, abnd 8010 ft.

Harris County—Hebert & Smith's Harris 1, Galveston Island, 330 ft fr ne line and 660 ft fr nw line of lots 34 and 346, Hall & Jones sur, abnd 6706 ft.

Newton County—W. M. Oil Co.'s Smith 1, 8 mi s of Call, 466 ft w and 466 ft n from nwc of sec 34, H.T.&B. sur, abnd 8005 ft.

UTAH

FIRST REPORTS

Grand County—Big Six Oil Co.'s 1, se 23-22s-19e, on Salt Valley anticline, eastern Utah, spd 100 ft and running 8¼ in csg to 80 ft. Standard tools.

VIRGINIA

FIRST REPORTS

Wise County—Virginia Coal & Land Co.'s Fee 1, 6 mi south of Coeburn, dr below 3000 ft.

WYOMING

FIRST REPORTS

Weston County—Pedro Trust Co.'s Fee 1, nw sw sw 31-46n-62w, Pedro area, east of Osage field, spd 65 ft with rotary tools. Starting 11 in hole.

Yuma County wildcat ready for test after strong shows

Phoenix, Ariz.—Yuma Valley Gas & Oil Company's Musgrove 1, in NE 11-11s-25w, southern Yuma County, was being prepared for a drill-stem test late last week after coring 9 feet of partial saturation in sand from 3320 to 3330 feet. The well, which is a rotary project 15 miles south of Yuma and 100 yards from the International Boundary, has small shows of high-gravity oil at frequent intervals from 600 feet to present depth.

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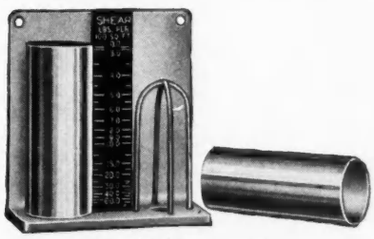
NOTES FOR THE Equipment Buyer and User

Shearometer

BAROID SALES DEPARTMENT

The Shearometer has been introduced by Baroid Sales Department, Los Angeles, Houston and Tulsa, and is an A.P.I.-approved instrument for the field determination of the shear or gel strength of drilling fluids. It combines simplicity of design and operation with sufficiently accurate determinations for field requirements.



Baroid Shearometer

The Baroid Shearometer Set consists of two 5-gram Shearometer tubes, a direct-reading scale, and a holder. Two Shearometer tubes are included so that two determinations may be made without having to clean and dry each tube after every test.

The shear or gel strength is determined in terms of force per unit area. Consequently the scale is calibrated to read directly in pounds per 100 square feet in a range from 3.0 pounds per 100 square feet to 60.0 pounds per 100 square feet with the 5-gram Shearometer. Readings down to 1.5 pounds per 100 square feet are possible by using a 2.5-gram Shearometer which is also available. To use the scale with this type, it is necessary to divide the scale reading by two to obtain the correct gel strength reading.

To run a test with the Shearometer it is merely necessary to place the Shearometer very gently on a quiescent surface of the mud sample and allow it to sink vertically until it comes to rest. The depth of the penetration is then measured on the scale and the gel strength read directly therefrom in pounds per 100 square feet.

The Shearometer not only affords a simplified means of determining the gel strength of drilling mud but has the added advantage of being able to measure the mud's resistance to the settling of an object through the mud. This resistance is comparable to that offered by the mud in the system in opposing the settling of cuttings.

Test Gauge

MANNING, MAXWELL & MOORE, INC.

Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut, through its Ashcroft Gauge Division, has perfected a new laboratory test gauge for testing the accuracy of pressure gauges. The outer edge of the dial is a mirror on which the tip of the pointer reflects if the user is not in correct position to read the gauge accurately.

The gauge has a transparent cover

Ashcroft Laboratory Gauge

which opens the dial for easy reading. It is molded of transparent plastic with a compression strength of 15,000 pounds to the square inch.

Belt Drives

American Leather Belting Association, 100 Gold Street, New York, has published a data book so that users of automatic tension pivoted motor leather belt drives may select the correct installation without difficulty. The book is modeled after the standard V-belt drive data books. Frontal pages of the book, which is profusely illustrated, are a diagrammatic and tabular demonstration of the advantages of belting in short center drive systems.

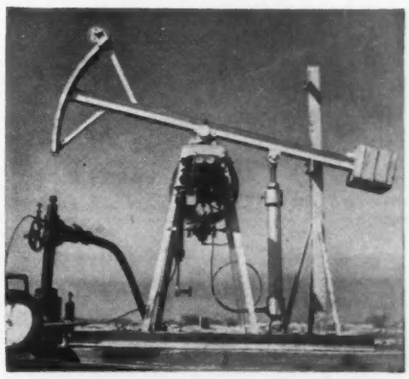
Gas-Lift Intermitter

THE S. M. JONES COMPANY

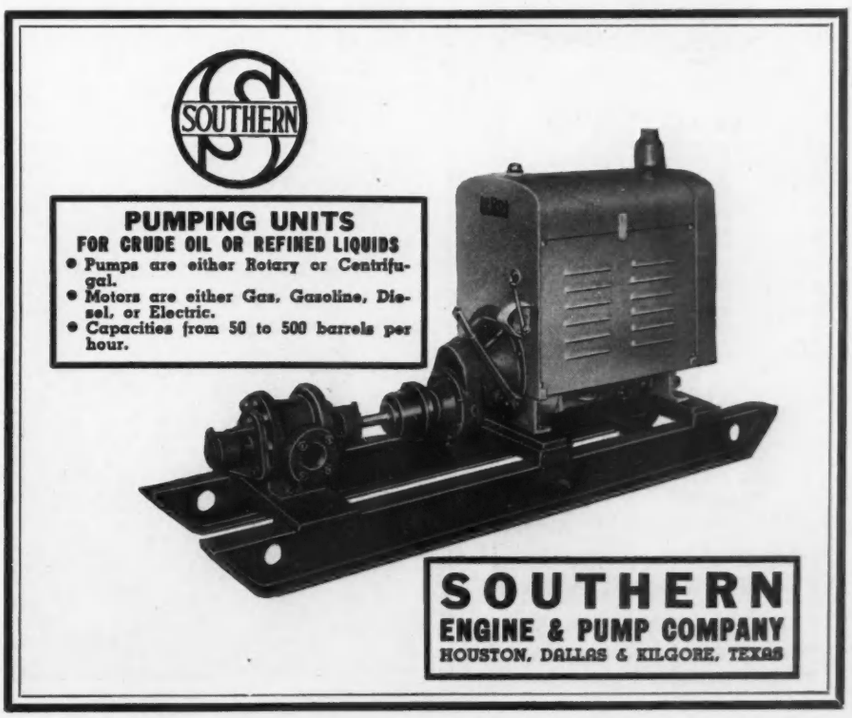
The S. M. Jones Company, Toledo, Ohio and Tulsa, Oklahoma, announces purchase of exclusive manufacturing and sales rights of the H. M. Staggs patents for a surface-controlled gas-lift intermitter which will be marketed under the name of the "Jones-Staggs Intermitter."

An announcement pointed that this new interest is in line with the company's established policy of confining its activities to specialization in artificial oil lifting problems. Some time ago this interest and appreciation of production problems led to the study of various types of devices accomplishing this purpose and experimental gas-lift intermitters were manufactured by the company and tried as early as 1935.

The Jones-Staggs Intermitter, it was



Jones Gas-Lift Intermitter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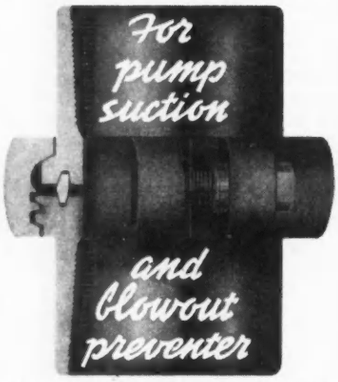

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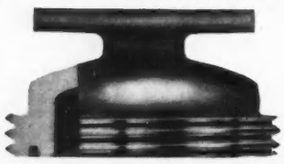

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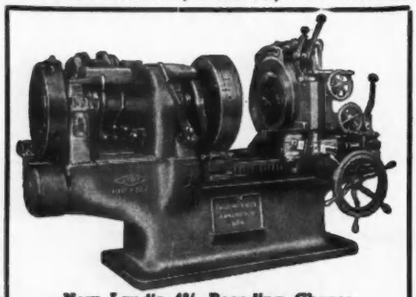

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NOTES FOR THE Equipment Buyer and User

said, is a proved and developed product with numerous installations under a variety of operating conditions in different fields; having now been in service some time. These installations have proved the soundness of this method of production effecting extremely low gas/oil ratios under procedures easily adapted to current oil field practices.

Arc Welder

THE LINCOLN ELECTRIC COMPANY

The Lincoln Electric Company, Cleveland, has added a new 200-ampere arc welder of the Lincoln Junior type. It is designed to cover many welding operations ordinarily associated with larger equipment. It will weld virtually all metals and alloys and do hard facing work.

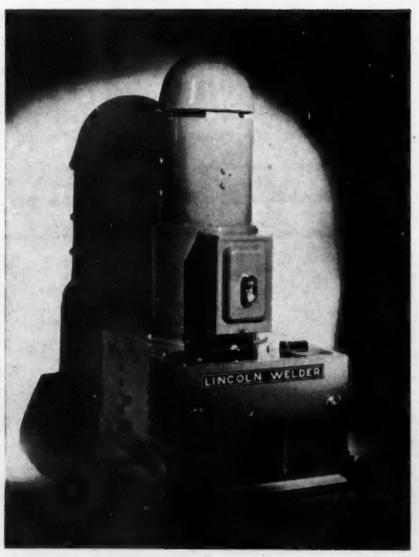
The new welder is single-operator, variable-voltage type and can be used with either bare or shielded-arc electrodes. It has a current range of 60 to 250 amperes.

A special feature is the dual continuous control, which permits independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration. Setting the welder is simplified; both voltage and current are self-indicating.

Use of Class B insulation accounts for ability of the unit to withstand sustained overloads. The coils, wound with glass-covered wire, are held in mica-lined slots separated by mica dividers, and the leads are connected into the commutator by special high-melting solder. End turns are insulated with mica tape. No inflammable materials whatsoever are used in these parts.

The motor is the "Linc-weld" squirrel-cage induc-type for across-the-line starting. Connections are readily available for either 220 or 440 volts (also supplied for 550 volts or special voltage); 3 or 2 phase; 60 cycles.

Construction is arc welded steel. Four steel feet arc welded to the base and drilled for bolting in permanent position, or for attaching of 3-wheeled running gear. The welder occupies less than 4 square feet of floor space. A lifting lug facilitates crane handling.



Lincoln Welder

Tobin Survey Issues Elaborate Book on Aerial Mapping

Edgar Tobin Aerial Surveys, San Antonio, Texas, has prepared an elaborate 70-page, plastic bound 11 x 14¼-inch brochure, "Maps for the Oil Industry," to explain the fundamentals of aerial mapping and to outline the scope of the Tobin service to the oil industry. The presentation is essentially pictorial, with sufficient explanatory material interwoven to make the book a complete aerial mapping manual that has reference value for every department of production activity.

First described is the operation of the flight ship and the instruments used to insure organization and accuracy; the pilot's procedure in mapping an area; and the development and cutting of the film to form a satisfactory mosaic. The use of ground measurement data—triangulation and traverse—to insure geodetic accuracy, and the methods of obtaining such data, are detailed.

The regional base map and the land ownership map, two recent developments of aerial photography with direct value to the oil industry, are explained as to the method of formulation. Of particular interest with reference to the latter is the description of the microfile camera and the methods used to photograph land abstracts in a county courthouse so that complete ownership information is available in condensed form at the survey office and the necessity for expensive searches in record vaults is eliminated. In the rear of the book photographic maps and negatives of remarkable workmanship are offered as examples of the manner in which aerial survey may improve upon conventional cartography.

R. C. Armstrong to Represent Texasteel in Gulf Coast Area

R. C. Armstrong has been made South Texas sales manager for Texasteel Manufacturing Company and has moved from Fort Worth to Houston. His territory will cover the area from

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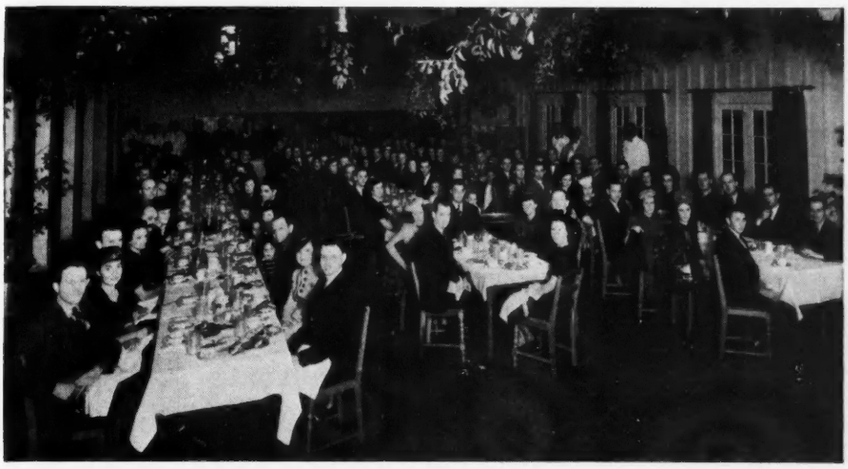

Rodney S. Durkee, of Los Angeles, president of Lane-Wells Company, has just completed a flying trip to Houston and Oklahoma City where he attended the annual Christmas parties of the Gulf Coast and Mid-Continent Divisions of the company. There were over 200 employees and families present at the two gatherings, and substantial bonus checks were distributed. The above photograph shows the Gulf Coast Division Christmas party at Houston.

Lake Charles, Louisiana, to the Mexican border. The company is expanding both its sales and production forces, and Armstrong's promotion and transfer is a part of this move.

Prior to his new position, Armstrong was city salesman for the company in

K. C. ARMSTRONG

Fort Worth and Dallas, and previous to that was at Wichita Falls as North Texas salesman for the firm. The present Houston address of Texasteel Manufacturing Company is 1836 Sul Ross, Telephone Keystone 33721.

W-K-M Bonus and Dividends Reflect Company's Progress

Announcement is made by W-K-M Company, manufacturers of Oil Field Equipment, of payment of a cash bonus to each of its employes, this bonus being somewhat in excess of two weeks

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average of each employe of the 1939 period.

W-K-M Company has also declared and paid a cash dividend on each class of outstanding stock—preferred, first preferred, common and class A common—this dividend being payable to each stockholder on record as of December 16, 1939.

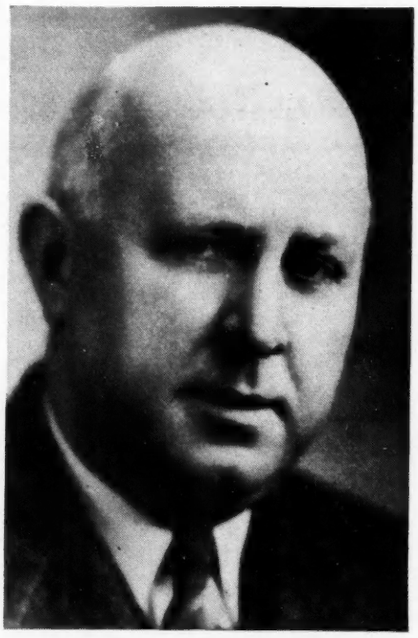
Very satisfactory progress has been made by this company for the past several years, and it now has no old obligations outstanding, having paid off all certificates of indebtedness and brought all obligations up to a current basis.

W-K-M Company has world-wide distribution of its products, and maintains representation in all oil fields, both in the United States and in foreign countries. The company also is distributor for a number of other manufacturers.

Middleton Goes to Dallas as Continental Director of Purchases

Announcement has been made of the appointment of R. L. "Tony" Middleton to the position of director of purchases for The Continental Supply Company with offices in Dallas, Texas.

For the past five years, Middleton has been stationed in Tulsa where he served as manager of machinery sales for The Continental Supply Company in the Oklahoma-Kansas district. A graduate of Mississippi State College in engineering, he was connected with General Electric Company for 10 years,



R. L. MIDDLETON

specializing in oil field problems before his association with Continental.

H. E. Spencer, former director of purchases, has been named manager of the newly formed material department at the general offices of the company.

F. H. Fowler Leaves Foote Brothers Executive Position

Foote Brothers Gear & Machine Corporation of Chicago, announce that F. H. Fowler, president and general manager has tendered his resignation, effective December 9, 1939, to accept a position as assistant to the president, and chief operating executive of The American Machine and Metals Inc., of Moline, Illinois and New York. Fowler will continue as a director and chairman of the executive committee of Foote Brothers Gear & Machine Corporation. W. A. Barr, vice president in charge of manufacturing of Foote Brothers has been elected executive vice president and general manager by the board of directors. F. A. Emmons, vice president in charge of sales and J. R. Fagan, secretary and treasurer, continue in their present offices.

Paramount Equipment Company Appoints District Representatives

Paramount Equipment Company, Tulsa, announces recent appointment of the following representatives:

Shermerhorn Young Sales Company, Dallas and Fort Worth, for Texas; M. L. Jackson, Shreveport, for North Louisiana, Arkansas and Mississippi; Urquhart Service, Denver, for the Mountain area, and Burton & Christenson, Los Angeles, for California. T. W. McCuiston, Tulsa, is a special representative in Oklahoma and Kansas.

Pipe Unions

Rockwood Sprinkler Company, Worchester, Massachusetts, is mailing a circular on three types of unions especially designed for oil field and refinery service, including a hammer lug nut union that can be made up and broken out without wrenches. Price lists and available sizes are included.

It's a Fact — Johnston

THE HUMAN FISHING TOOL

ON A CABLE TOOL WELL NEAR THROCKMORTON, TEXAS, IN 1921, THE BIT WAS LOST WHILE DRILLING AT ABOUT 600 FEET. A 24" HOLE WAS BEING CARRIED AT THE TIME. THERE WERE NO SUITABLE FISHING TOOLS HANDY SO THE "TOOLIE" VOLUNTEERED GOING DOWN THE HOLE TO RETRIEVE THE BIT. AFTER THE HOLE WAS PUMPED DRY HE WAS LOWERED TO THE BOTTOM ON A SAND LINE AND MANAGED TO MAKE THE BIT FAST TO THE DRILLING CABLE. BOTH "FISHING TOOL" AND BIT WERE THEN PULLED OUT. THE DRILLER PROUDLY INCLUDED A FULL REPORT OF THE CREW'S ACCOMPLISHMENT IN HIS DAILY LOG. BUT WHEN THE REPORT REACHED THE HOME OFFICE THERE WAS A "BLOW-UP", WITH THE RESULT THAT THE ENTIRE CREW, INCLUDING TOOL PUSHER, WAS FIRED FOR TAKING UNNECESSARY CHANCES.

BUT THERE'S NO NEED FOR SUCH RISKY OPERATIONS TODAY—NOT WITH THE UP-TO-DATE TOOLS ALWAYS AT YOUR CALL. LIKE THE JOHNSTON VIBRO-JAR, FOR INSTANCE...THE TOOL WITH THE REVOLUTIONARY NEW JARRING PRINCIPLE OF CONSTANT VIBRATION, COUPLED WITH A STEADY UPWARD STRAIN ON THE FISH. THERE'S NO OTHER TOOL LIKE IT. IT'S FAST, IT'S POSITIVE... AND IT'S FAR MORE EFFICIENT!

FIND OUT ALL THE FACTS ABOUT THE JOHNSTON VIBRO-JAR TODAY... HOW CONSTANT CONTROLLED ROTATION GIVES YOU FAR MORE BLOWS PER MINUTE... HOW THE STEADY UPWARD STRAIN KEEPS THE FISH COMING, ONCE STARTED... AND HOW THE JAR, INDEPENDENT OF ALL DRILL PIPE STRAIN, CAN BE ADJUSTED TO GIVE MAXIMUM EFFECTIVENESS AT ANY DEPTH. WRITE FOR COMPLETE INFORMATION, OR SEE YOUR LATEST COMPOSITE CATALOG!

Johnston

FIVE DOLLARS ($5.00) WILL BE PAID FOR EACH INTERESTING OR UNUSUAL FACT CONCERNING THE PETROLEUM INDUSTRY (EITHER IN THE UNITED STATES OR ABROAD) WHICH IS USED IN THIS SERIES OF JOHNSTON ADVERTISEMENTS. SUBSTANTIAL PROOF MUST ACCOMPANY EACH CONTRIBUTION. WHEN TWO OR MORE SIMILAR FACTS ARE SENT IN, THE AWARD WILL BE GIVEN TO THE FIRST ONE RECEIVED ...

M. O. JOHNSTON OIL TOOLS, Inc.
3117 SAN FERNANDO RD. LOS ANGELES CALIFORNIA. TELEPHONE ALBANY 0186
BAKERSFIELD 2794 VENTURA 5621

Squeaks from the Bull Wheel

Gratitude

Bridget had been discharged.

Extracting a $5 bill from her wage roll, she threw it to Fido.

Then the shocked mistress heard her exclaim: "Sure'n I niver fergit a friend. That's fer helpin' me wash the dishes."

Ready to Move In

Dad—What type of young man is this new friend of yours?

Daughter—Well, he says he has always wanted a good home.

That sounds promising.

Yes, and he likes ours.

Ahem!

Reporter: "Do your men get up bright and early?"

Athletic Coach: "Just early!"

Creature of Habit

First Burglar: "Hey, let's get out of this. We've broken into the home of the heavyweight champion!"

Second Burglar: "Aw, don't let dat worry youse; he wouldn't fight for nothin' less dan a million dollars."

Q.E.D.

"If a man steals, no matter what, he will live to regret it."

"You used to steal kisses from me before we were married."

"Well, uh . . . you heard what I said."

Caution

"Now on this ring I should like you to engrave: 'For my darling Muriel.'"

"Would it not be better to have simply: 'For my darling'? You see, sir, it will be at least a week before we can let you have the ring."

Still Hope

"I'm sorry I brought you here Dorothy. This is hardly a show for a girl of your age."

"Oh, that's all right, Dad. It may liven up a bit before the end."

Stop!

Abe's boy Ikey was in the outer office when a telegram arrived, and the stenographer called out: "A wire from the salesman, Mr. Bernstein."

"Read it out loud to me," the boss called back from the inner room. So she started:

"Was in Dallas Monday stop be in Houston Wednesday stop be in New Orleans Thursday stop—

Here Abe interrupted.

"Ikey, leave that girl alone and let her read the telegram."

Too Far

Harrison was proud of his golf, and had brought his mother-in-law along to watch him play with a friend.

"I'm particularly anxious to make a terrific drive just now," Harrison told his friend. "There's my mother-in-law over there, and I—."

"Don't be a fool," said his friend. "You'll never hit her at 200 yards!"

Diplomat

Tramp: "But, lady, every Christmas for 25 years I've received something from this house—since before you were born."

Miss Fortyodd: "Oh, well, that's different. I'll see what I can do."

No Myth

"I read in a book that Apollo was chasing a nmpyh and she turned into a tree."

"He was lucky. Those I chase always turn into a night club or a restaurant."

Mixed Metaphor

Mother: "After all, he's only a boy, and boys will sow their wild oats."

Father: "I wouldn't mind if he did not mix in so much rye."

Sad Blow

"What's the matter with your wife? She's all broken up lately."

"She got a terrible jolt."

"What happened?"

"Why, she was assisting at a rummage sale, took off her hat and somebody sold it for 35 cents."

On Tour

A negro came into the ticket office and asked for two round-trip tickets to Charleston. The agent knew him well and asked who was going with him.

"My brother."

"Where is he?"

"Out there in a box. He's dead."

"Well, if he's dead, you don't want a return ticket for him."

"Yes, suh. You see we ain't gwine to bury him in Charleston, but we have 'bout forty kin folks there an' we figgered 'twould be cheaper to take him to Charleston than to bring dem all down here."

Choking

"What is that gurgling noise?"

"I'm trying to swallow that line you're throwing."

Good and Sufficient Title

A New Orleans attorney was retained by a New York law firm to examine the title to a tract of oil land in South Louisiana, and he prepared an opinion in which he traced the title back to 1803.

Having studied the opinion, the New York firm wrote to the New Orleans lawyer that the opinion was all right as far as it went but that the title prior to 1803 had not been satisfactorily covered.

Following is a copy of the New Orleans attorney's reply:

"Dear Sirs: I am in receipt of your favor of the 10th inst. inquiring as to the state of the title to this property prior to the year 1803.

"Please be advised that in the year 1803 the United States of America acquired the territory of Louisiana from the Republic of France by purchase; the Republic of France had in turn acquired title from the Spanish crown by conquest; the Spanish crown having originally acquired title by virtue of the discoveries of one Christopher Columbus, a Genoese sailor who had been duly authorized to embark upon his voyage of discovery by Isabella, queen of Spain; Isabella, before granting such authority, had obtained the sanction of his holiness, the pope; the pope is the vicar on earth of Jesus Christ; Jesus Christ is Son and Heir-Apparent of God; God made Louisiana."

Gotkool
WATER CANS
& COOLERS
GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug fitting large removable top, handy non-leaking push button faucet. GOTT Water Cans for handy field use. Your Supply Store has them, get one today! . . . .
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WINFIELD, KANSAS
KEEP PURE DRINKING WATER ALWAYS HANDY

INDEX TO ADVERTISERS

★ Indicates that detailed information on the manufacturers' products or services may be found in the 1939 edition of the Composite Catalog of Oil Field & Pipe Line Equipment.

A

	Page
*J. S. Abercrombie Co.	—
*Abercrombie Pump Co.	—
Acme Gas Lift Co.	—
Air Reduction Sales Co.	—
*Ajax Iron Works	—
*Allsteel Products Manufacturing Co.	—
*Alten's Foundry & Machine Works	—
*American Askania Corp.	—
American Assn. of Petroleum Geologists	—
*American Cable Division of American Chain & Cable Co.	—
American Cast Iron Pipe Co.	—
*American Hammered Piston Ring Division of Koppers Co.	—
*American Iron & Machine Works Co.	—
American Manganese Steel Division of The American Brake Shoe & Foundry Co.	—
*American Meter Co.	—
*American Sand-Banum Co.	—
*American Steel & Wire Co.	—
Atlas Powder Co.	—
*Axelson Manufacturing Co.	—

B

*Baash-Ross Tool Co.	—
*Baker Oil Tools, Inc.	3
*Baldwin-Duckworth Division of Chain Belt Co.	—
*Bantam Bearings Corp.	—
*Baroid Sales Division	25
William M. Barret, Inc.	68
*Bartlett-Hayward Division of Koppers Co.	—
Bethlehem-International Supply Co.	—
*Bethlehem Steel Co.	—
Beverly Hotel	—
*Black-Sivalls & Bryson	—
Hotel Blackstone	—
*Bradford Motor Works	—
*The Brewster Co.	71
*The Bridgeport Machine Co.	—
*Broderick & Bascom Rope Co.	—
A. M. Byers Co.	—
Byron Jackson Co.	—

C

Jo H. Cable	71
*Cameron Iron Works	—
*Cardwell Manufacturing Co.	—
Carnegie-Illinois Steel Corp.	—
*J. I. Case Co.	—
*Caterpillar Tractor Co.	—
*Chain Belt Co.	—
*Chiksan Tool Co.	—
*Clark Bros. Co.	34-35
Clark Machine Co.	—
*Climax Molybdenum Co.	—
Columbian Steel Tank Co.	—
*Continental Motors Corp.	—
Continental Oil Co.	—
The Continental Supply Co.	37
Fred E. Cooper Co.	39
*The Cooper-Bessemer Corp.	—
*Core Laboratories, Inc.	—
*Crane Co.	—
*Crum-Brainard	—
W. H. Curtin Co.	—

D

*Darling Valve & Manufacturing Co.	—
Thos. Devlin Manufacturing Co.	—
*Diamond Chain & Manufacturing Co.	—
Dowell Incorporated	—
*The Dragon Manufacturing Co.	—
E. I. du Pont de Nemours & Co.	—

E

*Eastman Oil Well Survey Co.	—
Economy Electric Lantern Co.	—
*Elastic Stop Nut Corp.	—
Elmax Construction Co.	59
Enardo Foundry & Manufacturing Co.	—

F

*Geo. E. Failing Supply Co.	—
First National Bank in Houston	—
First National Bank & Trust Co. of Tulsa	55
*Fluid Packed Pump Company	—
Ford Motor Co.	—
The Fort Worth Clearing House Assn.	—
The Fort Worth Laboratories	68
*Foster Cathead Co.	—
The Benjamin Franklin Hotel	—
*Franks Manufacturing Co.	—
Frick-Reid Supply Corp.	31
Frost National Bank	—

G

*Gardner-Denver Co.	—
*The Garlock Packing Co.	—
Gas Lift Corp.	—
*Gaso Pump & Burner Manufacturing Co.	—
*General Electric Co.	—
General Geophysical Co.	—
General Motors Corp.	6
Geophysical Service, Inc.	—
*Goodyear Tire & Rubber Co.	—
*H. P. Gott Manufacturing Co.	73
*Grant Oil Tool Co.	—
*Gray Tool Co.	10
*Green Head Bit & Supply Co.	—
*The Guiberson Corp.	—
Gulf Envelope Co.	71
Gulf Publishing Co.	66

H

*Halliburton Oil Well Cementing Co.	—
Hardway & Cathey	68
*Harnischfeger Corp.	—
*Haynes Stellite Co.	—
*Hazard Wire Rope Division of American Chain & Cable Co.	Third Cover
The Hercules Powder Co.	—
The Hercules Steel Products Co.	—
Hewitt Rubber Corp.	—
Hoard Exploration Co.	68
*A. C. Horn Co.	—
Houston Laboratories	68
*Hughes Tool Co.	First Cover
Humble Oil & Refining Co.	—
*Hyatt Bearings Division	6

I

Independent Exploration Co.	—
The Inferno Co.	—
*Ingersoll-Rand Co.	—
*International Harvester Co.	—
*The International Nickel Co.	—

J

*D. O. James Manufacturing Co.	—
*Jarecki Manufacturing Co.	—
W. P. Jenny	68
*Jensen Brothers Manufacturing Co.	66
*Johns-Manville	—
*M. O. Johnston Oil Field Service Corp.	72
The Jones Oil Co.	—
The S. M. Jones Co.	8
*Jones & Laughlin Steel Corp.	Second Cover
Jones-Shelburne, Inc.	—

K

The Kennedy Valve Manufacturing Co.	—
*Kerotest Manufacturing Co.	—
*Keuffel and Esser Co.	—
*Kinzbach Tool Co.	—
*Koppers Co.	—
*Kropp Forge Co.	—

L

Landis Machine Co.	—
*Lane-Wells Co.	47
*Larkin Packer Co.	—
*The Layne & Bowler Co.	—
Le Roi Co.	—
Lee Rubber and Tire Corp.	—
Hotel Lenox	—
*A. Leschen & Sons Rope Co.	—
*The Lincoln Electric Co.	—
*Line Scale Co.	—
*Link Belt Co.	—
Lone Star Cement Corp.	—
*Lucey Boiler & Manufacturing Co.	—
*The Ludlow Valve Manufacturing Co.	—
*Lufkin Foundry & Machine Co.	—

M

*MacClatchie Manufacturing Co.	—
Macwhyte Co.	—
*D. S. Mair Machinery Corp.	70
*Maloney Tank Manufacturing Co.	—
Manhattan Rubber Division	—
The Marley Co.	—
Marmon-Herrington Co.	—
*Martin-Decker Corp.	—
McCollum Exploration Co.	—
McEvoy Co.	41
McGill Manufacturing Co.	—
McKissick Products Corp.	—
*Merco Centrifugal Co.	—
*Merco Nordstrom Valve Co.	—
*Metric Metal Works	—
*Midco Bailer Co.	—
*Miller Sand Pump Co.	—
*Mission Manufacturing Co.	—
*Lee C. Moore & Co.	—
*Morse Chain Co.	—
*Motor Improvements, Inc.	—
Mudrite Products Co.	—
Murray Rubber Co.	—
*Muskogee Iron Works	—

N

National Bank of Tulsa	—
*National Lead Co.	25
The National Supply Co.	27
National Tube Co.	—
*Novo Engine Co.	—

O

*O.C.S. Manufacturing Co.	—
*Walter O'Bannon Co.	—
*Oil Center Tool Co.	—
*Oil City Brass Works	70
Oil Well Supply Co.	7
*Otis Pressure Control, Inc.	71

P

*The Parkersburg Rig & Reel Co.	29
*Patterson Ballagh Corp.	—
*Pelican Well Tool & Supply Co.	60
Petroleum Electric Power Assn.	—
Petroleum Rectifying Co. of California	—
Petty Geophysical Engineering Co.	—
*Pittsburgh Equitable Meter Co.	—
*Pittsburgh Steel Co.	—
Plymouth Cordage Co.	—
*Portable Rig Co.	—

R

Raybestos-Manhattan	—
Reading-Pratt & Cady Division of American Chain & Cable Co.	—
*Rector Well Equipment Co.	—
*Reda Pump Co.	—
*Reed Roller Bit Co.	—
*Regan Forge & Engineering Co.	—
*Joseph Reid Gas Engine Co.	—
*Republic Steel Corp.	—
*The Ridge Tool Co.	—
Roper & Todd	68

S

Safety Gas Main Stopper Co.	70
Jack A. Schley	68
*Schlumberger Well Surveying Corp.	—
The Second National Bank of Houston	—
Seismic Exploration Co.	—
Seismograph Service Corp.	—
Shell Oil Co., Inc.	—
*SKF Industries, Inc.	—
A. O. Smith Corp.	—
*E. M. Smith Co.	—
*Howard Smith Co.	—
*South Chester Tube Co.	—
Southern Engine & Pump Co.	69
Southern Pacific Lines	—
Spang Chalfant, Inc.	—
*Sperry-Sun Well Surveying Co.	—
Standard Supply and Hardware Co.	—
*Standco Brake Lining Co.	70
*Star Drilling Machine Co.	—
Stevens Hotel	—

T

*Templeton, Kenly & Co.	—
Texaco Development Corp.	—
The Texas Corp.	—
Texas Electric Steel Casting Co.	Fourth Cover
Texas Foundries, Inc.	—
*Texas Iron Works	—
Thermoid Rubber, Division of Thermoid Company	—
Thompson Tool Co.	—
*The Timken Roller Bearing Co.	—
Town House Hotel	—
*Tretolite Co.	—

U

*Union Wire Rope Corp.	—
Union Carbide & Carbon Corp.	—
*Unit Rig & Equipment Co.	—
*United States Rubber Co.	—
United States Steel Corp.	7 and 23
*Universal Atlas Cement Co.	23

V

Vickers, Inc.	5

W

Warner & Swasey Co.	—
The Watson-Stillman Co.	—
*Waukesha Motor Co.	—
Webster Engineering Co.	—
*Well Machinery & Supply Co.	—
*Westinghouse Electric & Mfg. Co.	—
*The Wheland Co.	—
*Wickwire Spencer Steel Co.	—
*J. H. Williams & Co.	4
*Wilson Manufacturing Co.	—
*Wilson Supply Co.	—
Witte Engine Works	—
*Worthington Pump & Machinery Corp.	—
Wyatt Metal & Boiler Works	—

Y

Youngstown Sheet & Tube Co.	—

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The BJ ELLIOTT WIRE LINE CORE DRILL recovers consistently cores which are 10 feet or more in length, because . . . (1) the Inner Barrel is 12 feet and 6 inches long; (2) the proper bit and core catcher may be selected to suit the formation being penetrated; (3) circulation is always directed to wash the cutting edge, thus preventing the bit from becoming balled up; and (4) the patented Inner Barrel Valve creates a suction which not only relieves the core from pressure, but aids in drawing it into the Inner Barrel.

SEE YOUR NEW 1940 COMPOSITE CATALOG for DETAILED DESCRIPTION

BJ ELLIOTT WIRE LINE CORE DRILL SAVES ROUND TRIPS *SPEEDS DRILLING*

The outer barrel of the BJ Elliott Wire Line Core Drill is a heavy drill collar. When cores are desired, the Drilling Assembly is removed with the wire line overshot, and the Coring Assembly is dropped into position. Thereafter, you can core *continuously*, or *drill and core alternately*, without pulling the drill string from the hole.

BJ Elliott 2-Way Soft Formation Bit

BJ Elliott 3-Way Soft Formation Bit

BJ Elliott Hard Formation Bit

BJ ELLIOTT

WIRE LINE CORING AND DRILLING EQUIPMENT

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in Business for Your Safety

AMERICAN CABLE
TRU-LAY *Preformed* DRILLING LINES

THE TRUE STORY OF A SLOGAN—

Most slogans for business organizations are coined phrases designed to help sell either merchandise or service. Our slogan, "*In Business for Your Safety*," voices this company's policy; this organization's spirit.

More than thirty years ago Weed Tire Chains were put on the market to make motoring safer. Thus the American Chain and Cable Company was conceived in Safety and has always been dedicated to that ideal. Today ACCO products are to be found serving faithfully and safely in nearly every field and industry.

Fifteen years ago we introduced preformed rotary drilling lines—American Cable TRU-LAY. We did so not only because preforming made TRU-LAY a line of longer service but—a safer line. TRU-LAY Preformed is safer to handle; safer to use. It resists whipping; spools better; makes possible faster round trips. Broken crown wire doesn't wicker out to jab workmen's hands. The heritage of safety is a tradition with American Chain & Cable men. The entire organization stands as a single unit behind the true meaning of "*In Business for Your Safety.*"

BUY ACCO QUALITY *whether for American Cable Wire Lines—American Welded and Weldless Chains—Ford Chain Blocks—Page Welding Wire—Reading-Pratt & Cady Valves—or any of the other 137 ACCO Quality Products.*

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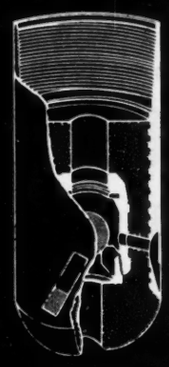
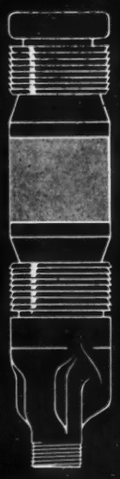
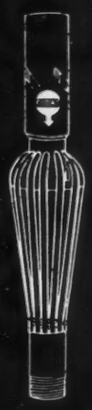


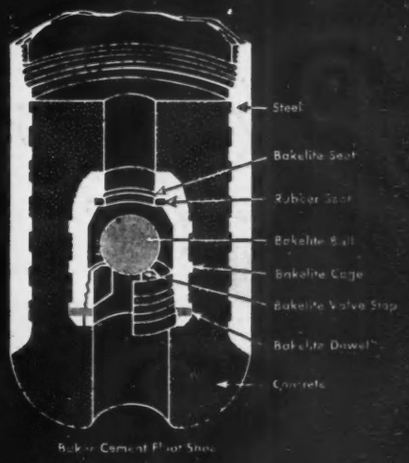
Baker Cement Wash-Down Whirler Float Shoe



Baker Model "K" Cement Retainer



Baker Cement Whirler Float Collar with Solid Bottom Baffle, with Metal "Fetal" Basket



Baker Cement Float Shoe

Successful Oil Tools

ARE "DEVELOPED" NOT "DISCOVERED"

THE HISTORY of the machine age is a continuous story of discoveries . . . discoveries which opened the vistas to the remarkable period in which we now live. Discoveries, however, while tremendously important, are only the nucleus or starting point, for to be of commercial value most "discoveries" or inventions must be "developed."

It is both fortunate and unfortunate that oil tools are no exception to this rule. Fortunate because it is only through this tedious development period of trial and error that the refined product or tool can result . . . unfortunate perhaps (from the manufacturer's cost standpoint), because usually the development period continues more or less indefinitely as the result of constantly changing conditions under which the tool must operate; or requirements such as higher efficiencies which must be met.

Thus, products, such as make up the Baker Line of Oil Tools, which have been some thirty years in the development process, acquire a certain "face value" which operators have been quick to recognize and appreciate. Oil men the world over know that a tool or device bearing the word "Baker" reflects an invaluable background of accumulated experience . . . a background that results in the ability of each and every Baker tool to successfully perform the task for which it was designed.

Operating and supervising personnel, upon whose shoulders rests the bulk of responsibility for results, are doubly appreciative of this highly important background as it affords a measure of reassurance and peace of mind, the value of which is difficult to calculate in cold terms of dollars and cents.

The familiar Baker slogan "Practical and Dependable," is more than simply a play on words . . . it means just that, for to be successful, oil tools must necessarily be "practical and dependable" and practicability and dependability result from constant *development* . . . not *discovery* alone.

BAKER OIL TOOLS, INC.

P.O. BOX 71, HUNTINGTON PARK, CALIFORNIA
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Real Economy
HOSE

It's the ultimate per-hour cost that determines the economy of rotary hose.

Grizzly Rotary Hose always has enjoyed an enviable reputation for long, trouble-free service. The new Grizzly Pressure-Seal Hose will establish even higher standards of service and economy. It is the strongest, most flexible, longest wearing rotary hose possible to fabricate *regardless of price*, and will stand up under the deepest, highest-pressure drilling over periods of years; thus reducing per-hour costs to new, all-time lows. Ask your supply dealer, or write for Bulletin No. 20-OF.

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New York
OPPOSITE THE WALDORF-ASTORIA

THE *Beverly* HOTEL

LOOKING AHEAD

WITH THE EDITOR

Combating Paraffin in Pumping Wells.

PARAFFIN is troublesome wherever found in wells, regardless of the rapidity or slowness with which it is deposited on rods and in tubing.

There are two main general methods by which the product may be removed, one involving chemical means, the other involving mechanical means. Into the classification of each of these fall numerous locally applicable methods for its removal. But it is safe to say that the method applied locally in many cases might be inferior in results to some other method if the men in the locality knew of that other method.

Hence, we believe that readers of THE OIL WEEKLY will look forward to early publication of a series of articles dealing with removal of paraffin and reduction of paraffin production.

Two such articles already are "on the hook." One deals with chemical removal of paraffin from pumping wells. The other deals with mechanical means of handling the situation.

The second article, written after a study of many pumping districts where profitable operation has become largely a problem of paraffin control, deals not only with mechanical means of removing paraffin from the well proper but from surface lines as well. It also deals with theories on the causes of accumulation of paraffin. It tells of where swabbing has proved effective, of where sccraping has done the job, and of cases where a combination of the two, or application of some other method permitted pumping the expected amount of oil.

The OIL WEEKLY, Published every Monday. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

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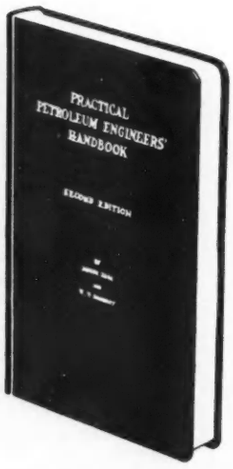

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LETTERS TO THE EDITOR

Missed Permits

DEAR SIRS:

Your chart on comparison of permits granted for new wells (all states) did not appear in our copy of the December twenty fifth issue or it might be we are unable to locate this chart.

Will you please advise us, if this chart was in this issue, as we would like have this information.

F. S. FINNEGAN,
Production Auditor
Navarro Oil Company,
Houston, Texas.

Others also may have missed the table showing comparison of permits granted for new wells, which has appeared in THE OIL WEEKLY for many years. The table was published in a new form, being combined with the completion table, and was on page 62 of the December 25 issue. Hereafter, it will be published in its new dress and with the tabulation of completed wells.

Likes New Completions Form

DEAR SIR:

I wish to compliment you on the manner in which "United States Well Completions" are now carried in THE OIL WEEKLY. There are many of us who have frequent occasion to refer to the completion summaries, and they are now more readily available and easier to work with than formerly when the individual districts were summarized separately.

With the season's greetings and best wishes for your continued success.

C. A. WARNER
Houston Oil Company of Texas
Houston, Texas.

Barrels in Pipe

DEAR SIR:

As a regular reader of THE OIL WEEKLY I noticed the chart contained in the December 4 edition of THE OIL WEEKLY, prepared by Mr. W. F. Schaphorst, as a quick means for finding the number of barrels in a casing string. Well, it is a quick way, and a good estimate, but I have a better way.

My method is simply to multiply the diameter of the pipe by itself, and the resulting figure will give the amount in barrels for a thousand feet. For additional depth, then multiply the number of thousand feet. Example: you have a six-inch oil string, and the fluid is standing three thousand feet in the hole, the calculations would be—6×6 which is 36, $\times 3$ which is 108 barrels. You can check this on Mr. Schaphorst's chart, and you will find the result is the same, but you haven't any chart to hang in the dog house or carry in your pocket.

I worked for the Gulf Oil Corporation in the Goldsmith area of Ector County for two years, working with the Engineering Department and used this method all the time. I am now at the University of Pittsburgh and studying law.

Hoping this method might be of some use to you, and wishing you continued success in your publications, I am

JOHN E. MCKELVEY
Butler, Penna.

East Texas Reservoir

DEAR SIR:

Dr. Gardescu, in his article, "Equitable Proration of Marginal Leases in East Texas," in your December 25th issue, makes a statement which is contrary to my conception of reservoir conditions and I would appreciate the reasoning back of the statement.

The statement is: "If the field is then closed in for some time, the water will not remain at that same level but will continue to encroach, pushing the oil ahead and building up the depleted reservoir pressure of the field."

Each barrel of oil removed from a reservoir must be replaced by something, as a void cannot be created. The space formerly occupied by oil is replaced by oil, gas or water. Expansion of water and oil upon the reduction of pressure may take up a very small percentage of the produced volume.

It has been shown that no free gas appears in the East Texas reservoir until the reservoir pressure is reduced below 755 pounds absolute. If the reservoir pressure is above that amount, the pore spaces must at all times be completely filled with oil or water and upon a field shut-down there can be no movement of the water and oil except to compensate for the slight compressibility under an increase in pressure. Following this reasoning, the pressure build-up during a shut-down is from pressure transmission through a relatively solid medium, rather than by lateral migration. This would explain the much greater rate of pressure increase during the shut-down than the normal rate of pressure decrease during production.

Consider the analogous hydraulic example of an elevated water tank with a water line dropping to the ground and then along the surface, extending east. Along the surface line are outlet connections. With all outlets open there is a pressure drop, grading from west to east, due to frictional loss, yet the line is completely filled with water. Shut off all connections and there is a recovery of pressure without any plan or movement of water. It is simply pressure transmission.

What is wrong with my reasoning?

T. A. HALL,
Appraisal Engineer,
First National Bank in Dallas.

We asked Dr. Ionel I. Gardescu to reply to Mr. Hall's letter, and he writes as follows:

"Mr. T. A. Hall is quite right when he states that the compressibility of East Texas oil is small. Nevertheless, the following calculation will show that its re-

sults are of material consequence to the marginal lease owner:

"The coefficient of the compressibility of the East Texas oil, according to the East Texas Reservoir Progress Report, is .00093% per pound per barrel at an average bottom-hole pressure of 1169 pounds. As the reservoir pressure decreases the coefficient increases a little up to the saturation pressure of the oil with gas. Below this pressure the compressibility is increased materially.

"An estimated 100 pound increase in pressure during the shutdown period of the East Texas field would result in a shrinkage of the oil due to the compression of .093% per barrel. Assuming the oil reserve of East Texas as being 2,000,000,000 barrels, the shrinkage of the oil during a shutdown period would be 1,860,000 barrels. The shrinkage of oil would be followed by an encroachment of the edge-water which will drive off from the marginal leases the quantity of 1,860,000 barrels of oil. This estimate is conservative because it is based on a minimum value of the coefficient of compressibility.

"Figured on a lease basis, a shrinkage of .093% will reduce the height of the oil column of 185 feet (from 3320 to 3135) by two inches, which may not seem very much but an encroachment of water by two inches during the period of shutdown represents a loss of oil to the marginal lease owner and operator of 323 barrels per acre, or 3230 barrels per well, on the basis of a 10 acres per well density."

IONEL I. GARDESCU.
Gardescu and Speed,
Consulting petroleum engineerings and geologists, Houston, Texas.

Texas Research

DEAR SIR:

I regret that you failed to mention in connection with my article in THE OIL WEEKLY of December 25 that the experimental work was conducted in the laboratory of the Bureau of Industrial Chemistry at the University of Texas.

It is my hope you will be able to insert a short note of acknowledgment in your next issue.

JUDSON SWEARINGEN.
Austin, Texas.

We are glad to publish the above acknowledgment to the University of Texas' Bureau of Industrial Chemistry, where Mr. Swearingen is research associate. His article was entitled "Predicting Wet Gas Recovery in Recycling Operations."

"Mosquito Bill"

DEAR SIRS:

Your article entitled "Don't let gas lock rob your pumps" by Huston Huffman, which appeared in the October 23rd issue of THE OIL WEEKLY was one of the best I have ever read on this subject.

I am not familiar, however, with the "mosquito bill" anchor and would appreciate it very much if you could give me some information on this type anchor.

C. W. MCINTOSH,
Production Superintendent
The Sloan and Zook Company,
Homer, Louisiana.

The "mosquito bill" anchor is the simplest and most common type of anchor. It consists of two parts: a length of tubing, plugged at its lower end and perforated at the top, screwed into the seating shoe of the working barrel. Into this tubing projects a smaller piece of pipe, screwed into either the bottom of the standing valve or a bushing in the seating shoe. This smaller pipe is the "mosquito bill." As the oil and gas enters the larger tubing through the perforations and passes down the annular space between the concentric tubes, the gas, by gravity separation, rises through the downward travelling oil and passes out through the perforations. Meanwhile, the oil enters the barrel through the "mosquito bill." This is a purely mechanical means of separation and does not effect the gas in solution. There is now on the market a separator which has as its aim the elimination of dissolved gas. It accomplishes this by utilizing the movement of the tubing to agitate the incoming fluid; which agitation results in a liberation of much of the dissolved gas.

You are doubtlessly familiar with it under a different name.

Union Oil Company building another tanker

Union Oil Company has awarded contract to Bethlehem Steel Company for construction of another 103,000-barrel capacity tankship. The new tanker will be a sister ship to the L. P. St. Clair, put into service last March, and the Victor H. Kelly, to be launched on January 6.

With delivery slated for the latter part of 1941, it is expected construction on the ship will begin in the early part of 1941. Like her sister ships, she will be equipped with every modern device for the safety and comfort of the men.

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